INSIDE: A VERITABLE PC HARDWARE PARTY
—And You're Our Guest of Honor!

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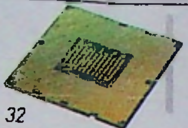

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MAY 2010

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Is our surprise winner protecting **YOUR** PC?

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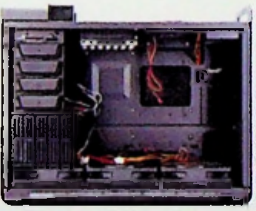

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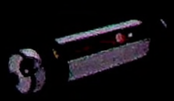

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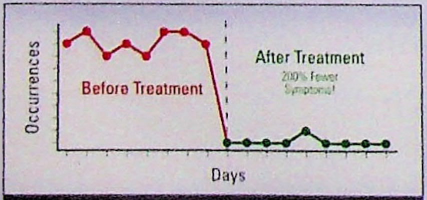
Good-bye

Sluggomorbus

Hello SuperSpeed USB



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MAY

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Tribbles provided by David Gerrold, MaximumPC.com columnist and tribble breeder. Go to www.tribbletoys.com for yours!

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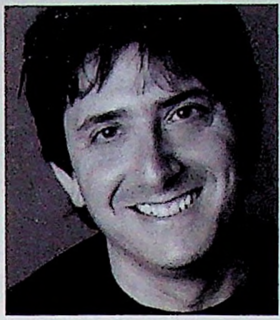


Displays, Not GPUs, Need More Tech Attention

Along with the CPU, the GPU is the component that *Maximum PC* treats with the greatest reverence. We gush over performance advancements, and holler ringside during Nvidia-vs.-ATI cage fights. And one really has to give props to the engineers who work on GPUs: The combined transistor count of the five graphics chips I placed on the Bitchin'*fast*!3D^{2000} in 1999 (go ahead, Google it) is about 3,000 times smaller than the 3 billion–odd transistors on Nvidia's upcoming Fermi chip.

But to what end do we celebrate GPUs? While I applaud R&D that delivers fancier rendering techniques, and while I know these features are only worth implementing if the GPU can actually deliver them at 60fps, we still need to acknowledge that GPU cheerleading errs toward overkill. In the grand scope of history, feature implementation in triple-A games has significantly lagged behind feature support in hardware and drivers. And by the time our favorite games begin implementing all the newest rendering tricks, our hardware can run them at a bazillion FPS.

I would never suggest that gaming-focused GPU development be de-emphasized, even though industry leaders seem to be doing just that in their efforts to get us interested in GPU compute. (And who could blame them? Now that Farmville is considered a "PC game," why bother with discrete graphics?) Nonetheless, it's time we begin showing more interest in the business end of the video pipeline: our displays.

Maximum PC has never been adequately obsessed with display technology. Maybe it's because the damn things don't spit out hard-and-fast benchmark scores, and as science nerds we gravitate toward empirical proof of product superiority. But displays are, in fact, the single-most important interface in our entire computing experience, and as a broad technology category, there's incredible need for advancement.

3D display hoo-hah is just a distraction. Display R&D should really be focused on delivering higher resolutions. ATI's Eyefinity technology allows one to run a 7680x3200 desktop across a clunky matrix of six 30-inch displays. But what if LCD manufacturing yields could affordably deliver a *single* big-screen display with that amazing resolution? Then we'd really have a need for insanely high-performing GPUs! The world also needs widespread deployment of color e-paper, and flexible displays that can be bent and rolled up at will.

Those developments are a long way off, but in the immediate future, we'll be doing our part to push display tech as an area of enthusiast interest. We're currently working on a story that busts a bundle of myths about consumer displays, so please email or tweet me your burning questions about display technology. We really want to know what you think about this under-reported hardware category.

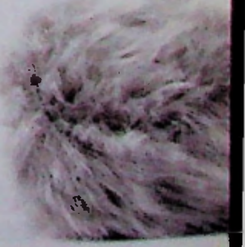
—JON PHILLIPS @JonPhillipsSF

MAY ISSUE FAVORITES

Lab Bench Secrets
page 14

Gulftown Lab Results
page 32

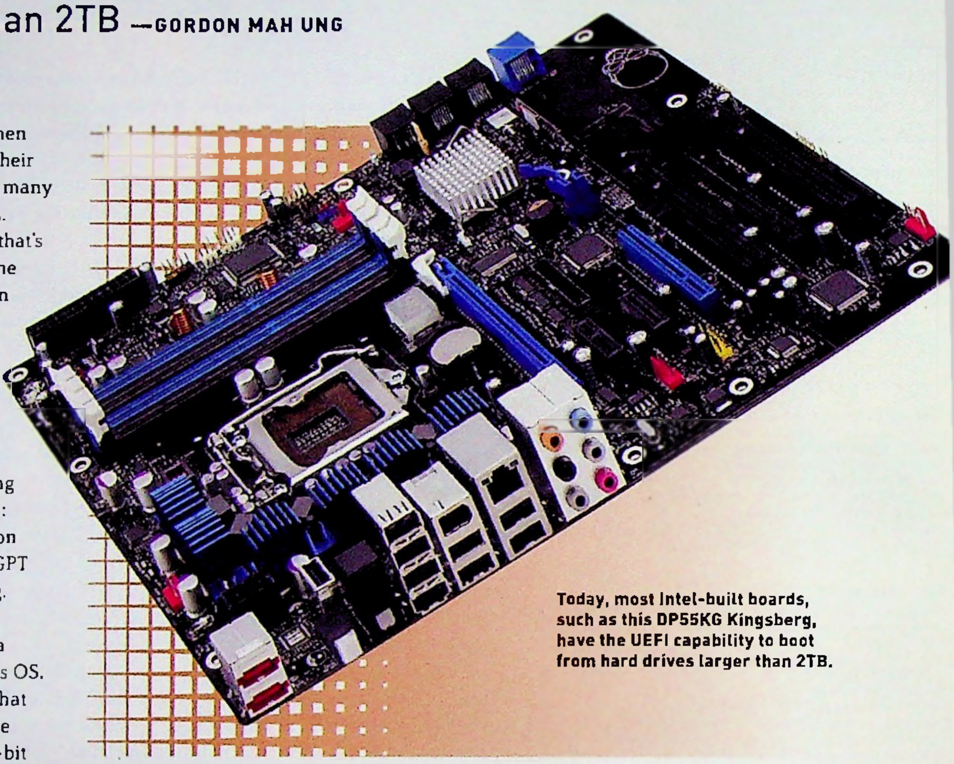
Tribble Trouble
everywhere!



LETTERS POLICY Please send comments and questions to jon@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, Jon is unable to respond personally to all queries.

The PC Hits a 2TB Wall

No easy fixes to getting systems up and running with hard drives larger than 2TB —GORDON MAH UNG



Today, most Intel-built boards, such as this DP55KG Kingsberg, have the UEFI capability to boot from hard drives larger than 2TB.

You probably don't know it, but when hard drive companies introduce their 3TB drives in the coming months, many systems won't be able to boot from them.

Why? Given the legacy-riddled PC, that's a complicated answer. Partly at fault is the 27-year-old, 32-bit partition table used in the master boot record on hard drives. With sector sizes of 512 bytes, the 32-bit partition table can only address a maximum two terabytes.

Folks who tried RAIDing four 1TB drives together were the first to run into this problem, but there has long been an easy solution for that scenario: Instead of using a legacy 32-bit partition table, you can build the RAID using a GPT partition, which uses 64-bit addressing.

This is where the other part of the problem comes in: You cannot boot to a GPT partition from any 32-bit Windows OS. The only two desktop Windows OSes that support booting from GPT partitions are 64-bit Windows Vista with SP1 and 64-bit Windows 7.

That's not all, though. Those two OSes will boot to a GPT partition *only* if your motherboard has UEFI (Unified Extensible Firmware Interface) support, as opposed to the ancient BIOS-based booting. Today, very few boards, with the exception of most made by Intel and some by MSI, even support UEFI.

But even if your PC has all the dots connected, you're not necessarily out of the woods—applications for backups, cloning, and antivirus that expect to see an MBR partition may cough up a hairball. Overall, it's a pretty lousy spot to be in for an industry that usually avoids such hard stops.

Tom Coughlin, a storage expert with Coughlin Associates, says it's not like we haven't been here before. Just a few years ago, the industry had to grapple with a 137GB limit on hard drives, BIOSes, and OSes. But why wasn't this current 2TB problem fixed along with the 137GB limit?

"[These issues] aren't fixed until it's a problem," Coughlin said. "Then they'll fix it for another five years or so. Then you run into the issue all over again."

Coughlin said he expects that it will take as long as a year for the issue to be ironed out. Large PC OEMs don't want to deal with complaints from customers and will put pressure on hardware vendors to find a solution.

Hard drive makers say they've been well aware of the issue for some time, but getting a fix hasn't been easy or timely. Seagate's David Burks said 18 months ago would have been a great time to rally the troops in search of a fix, but in the wake of the global financial crisis, few companies were putting resources toward fixing a problem for products that didn't exist yet.

Enthusiasts might not care about this much, as many now use an SSD as their primary drive. But there are still scenarios, such as in an HTPC, where a single 3TB or 4TB boot drive would be a preferred option. Yes, you can run multiple partitions to get around the problem, but that's not optimal, particularly as drives get ever larger.

Windows XP will pose the greatest challenge, as many users still cling to that OS. The industry is exploring workarounds. Western Digital said one that's being batted around is a new hybrid MBR that uses a legacy partition combined with a GPT partition to let older OSes boot from a high-capacity drive.

Something all parties agree on is that it's not a pleasant situation. For now, there are no high-capacity drives, so the problem is mostly theoretical, but once the first 3TB drives hit shelves, expect a messy transition.

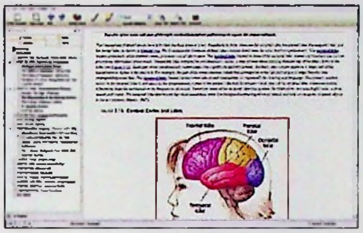
Razer Vespula

GEEK TESTED & APPROVED

The Vespula ($35, http://store.razerzone.com) is Razer's first reversible mouse pad—a rigid plastic plate with a different texture on either side for two distinct mousing feels. We don't foresee many gamers pausing mid-match to flip their Vespula over, but we do appreciate being given the choice between "fast" and "faster" mouse movements. The included gel wrist-rest is a dud, but the pad works fine without it. –AC

Wiki-Textbooks on the Way

DynamicBooks to replace hard-copy course material



College textbooks are a funny thing. Used in institutions where forward thinking is encouraged, they are as old-school as it gets. Besides being expensive, they are static and typically written for general audiences. Now, venerable textbook publisher Macmillan wants to shake things up with the DynamicBook.

Due out in August, DynamicBooks are basically wiki-textbooks. Authors can access them at any time to make changes or updates, so the material (theoretically) remains current. Instructors can access the text, either adding or deleting material, so the textbook more closely fits the course syllabus. Students get electronic access, via computer or Apple's iPhone (with plans for iPad availability). And the cost of DynamicBooks will be lower than traditional textbooks. For example, Macmillan says a psychology textbook that sells for $134.29 would be available as a DynamicBook for $48.76.

Macmillan isn't being altruistic here. It hopes DynamicBooks will kill the used-textbook market, which publishers say is the reason for high book costs. And, if pricing is low enough, Macmillan hopes to circumvent pirating. –BS

CABLEVISION'S PC-TO-TV MEDIA RELAY

Give 'em your content and they'll sell it back to you

Tom Petty said it best: "The boys upstairs want to see how much you'll pay for what you used to get for free."

New York's Cablevision plans to sell subscribers to its digital-cable and broadband Internet services a means of channeling videos, photos, and Internet video from their PCs to their TVs. Customers will install software that encodes the PC's video output in real time and uploads it to Cablevision's servers. The video will then be piped back through the company's network to the subscriber's TV using a channel dedicated to that customer.

Of course, you can do this today and control the process (with Cablevision's system, you'll need to be in front of your PC to initiate streaming and then run back to your TV to watch it). The DIY method is not entirely free (you need a router and a media streamer) but it beats paying subscription fees—and the video stays on your network. –MB

FAST FORWARD

TOM HALFHILL

Another Step Toward Reconfigurable Computing

What if your processors could redesign themselves to optimize performance for the program you're running at any given moment? They might spawn additional FPUs if the program uses floating-point math, or grow more texture shaders for 3D graphics.

This is the dream of reconfigurable computing. Today's processors are programmable, so they can perform an infinite variety of tasks. But their hardware is fixed, the circuits carved in silicon. Although each program uses the same logic gates for different purposes, those gates always perform the same basic functions. In contrast, a reconfigurable processor can change the functions of the gates, too.

We already have such chips. They're called programmable-logic devices (PLDs) or field-programmable gate arrays (FPGAs), and they've been around for many years. They are useful for some things but tend to be large, slow, and expensive.

In March, reconfigurable computing took another step toward the future when a Silicon Valley startup introduced a new kind of PLD. Tabula calls it a 3PLD, because it works like a three-dimensional chip with eight layers of logic stacked inside a single chip package. A real stacked chip is impractical, so Tabula implements the third dimension in slices of time.

Remember Einstein's theory of special relativity: Time is merely another dimension of space. Einstein called it the space-time continuum; Tabula calls it Spacetime technology. Tabula's chips reconfigure themselves so rapidly that each logic gate can perform eight different functions instead of one function. In Tabula's first-generation chips, the gates reconfigure themselves 1.6 billion times per second.

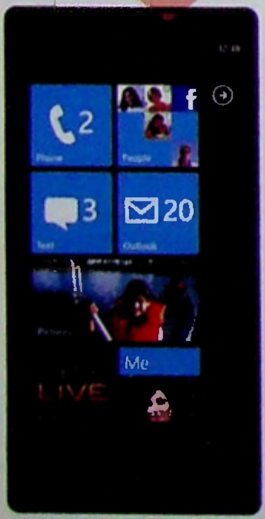
In effect, the chip seems larger than it really is, without the cost and power consumption of additional transistors. Furthermore, in Tabula's universe, time isn't linear—it's an endless loop. After each gate reconfigures itself for the eighth time, it reverts to its first configuration and starts again.

Tabula's chips are going into cellular base stations and other network equipment. They won't appear in PCs anytime soon. But they are another step toward the day when processors will reconfigure themselves for top performance—without human intervention and at speeds we cannot perceive.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

Win7 Phone Series Looks Promising

Windows Mobile has been stagnating for years, and even the oft-delayed Windows Mobile 6.5 didn't bring anything substantial to the table. Windows 7 Phone Series, announced in February, aims to change that. It's a completely new OS, and it s interface looks more like the Zune HD's than any smartphone interface we've seen. Windows 7 Phone Series' graphical interface will integrate Zune software (like iPhone does iPod), and incorporate Xbox Live info, Twitter, Facebook, Outlook email, and more. It's the freshest phone OS we've seen so far, with bright blocks of color replacing the shrunken-desktop UI every other smartphone OS is rocking. Windows 7 Phone Series is due out from a variety of carriers and manufacturers by the end of 2010. **–NE**



A High-Speed Pipe in Every Home

By the time you read this, the FCC will have presented Congress with its National Broadband Plan, an ambitious set of proposals intended to make high-speed broadband as universal in the United States as the telephone system. We know this because FCC Chairman Julius Genachowski gave the public a preview of the plan's recommendations, with the warning that "the rest of the world is not sitting around waiting for us to catch up."

The FCC's goals are sweeping: 90 percent broadband adoption rate, at 100Mb/s minimum, by 2020; increased competition among broadband Internet service providers by 2012; greater consumer protections against price gouging, unfair billing practices, anti-competitive bundling, unreasonable termination fees, and undisclosed interference with consumers' service within 12 to 18 months; better data collection standards for market analysis by 2010; and rules protecting open markets.

Once presented, it will be up to Congress to turn these reommendations into policy. **–KS**

Walmart Buys Vudu

Amid interest from Comcast, Amazon, and Best Buy, troubled movie-streaming service Vudu will be acquired by Walmart for a rumored $100 million.

The match makes a lot of sense. Walmart is the largest seller of DVDs, but has never had a platform for delivery of video over the Internet. With the purchase of Vudu, the retailer will have a mature service with many content deals already in place. Vudu stopped making a stand-alone hardware box last year, instead focusing on getting its software embedded in various devices like TVs and Blu-ray players. Guess who sells a lot of TVs? It would be reasonable to expect Walmart to aggressively push Vudu-enabled TVs and other devices now that it owns the service. Manufacturers might also be more receptive to adding the Vudu service to their products with behemoth Walmart involved. Walmart effectively drives down prices wherever it goes—could that also hold true in the video-streaming space? **–RW**

GAME THEORY

THOMAS MCDONALD

DRM and PC Gaming: an Intervention

Psst! Yeah, you: PC gaming industry. C'mere, I wanna talk to you private-like. You know that copy-protection stuff you've been trying since the zip-lock bag days? Well, it doesn't work. It's *never* worked. It never *will* work. Glad to see you keep trying, though. That's the spirit. Someone once said that the definition of insanity was doing the same thing over and over again and expecting different results. I dunno who said it. Dr. Phil, probably.

But seriously: I gotta give mad props to Ubisoft for creating something so intrusive that even dedicated antipiracy and DRM supporters stand back and say, "Whoa!"

Making people verify a game every time they play isn't that big a deal, so people should quit whining about it. I got five little letters for them: S-T-E-A-M.

But making people maintain a live connection throughout the play session, and then killing the game if that connection is lost? That's hardcore.

I think you're suffering from some kind of long-term memory-loss thingy. I remember a game that came with a dark purple piece of paper printed with codes in black ink. The codes had to be entered when you played the game. The black ink on dark paper was supposed to make the thing Xerox-proof. It was, literally, "copy protected."

It was also a) almost impossible to read, b) a pain in the keister, and c) easily defeated by a magical hacker technique called "handwriting."

You've tried code wheels, page/line/word lookups in manuals, CD checks, registration codes, online verification, and now, mandatory live, uninterrupted Internet connections. They all have two things in common: 1) they don't work, 2) they piss people off.

A guy who steals a game by downloading a hacked copy is, by definition, a thief and a lowlife. He deserves to be kicked so hard in the groin that he'll be wearing his scrotum for a shower cap. You're not teaching him a lesson by annoying decent people: You're just driving the decent folks to consoles.

PC gaming isn't being killed by piracy: You're committing suicide.

Now c'mon in off that ledge.

Thomas L. McDonald has been covering games for 17 years. He is an editor at large for *Games* magazine.

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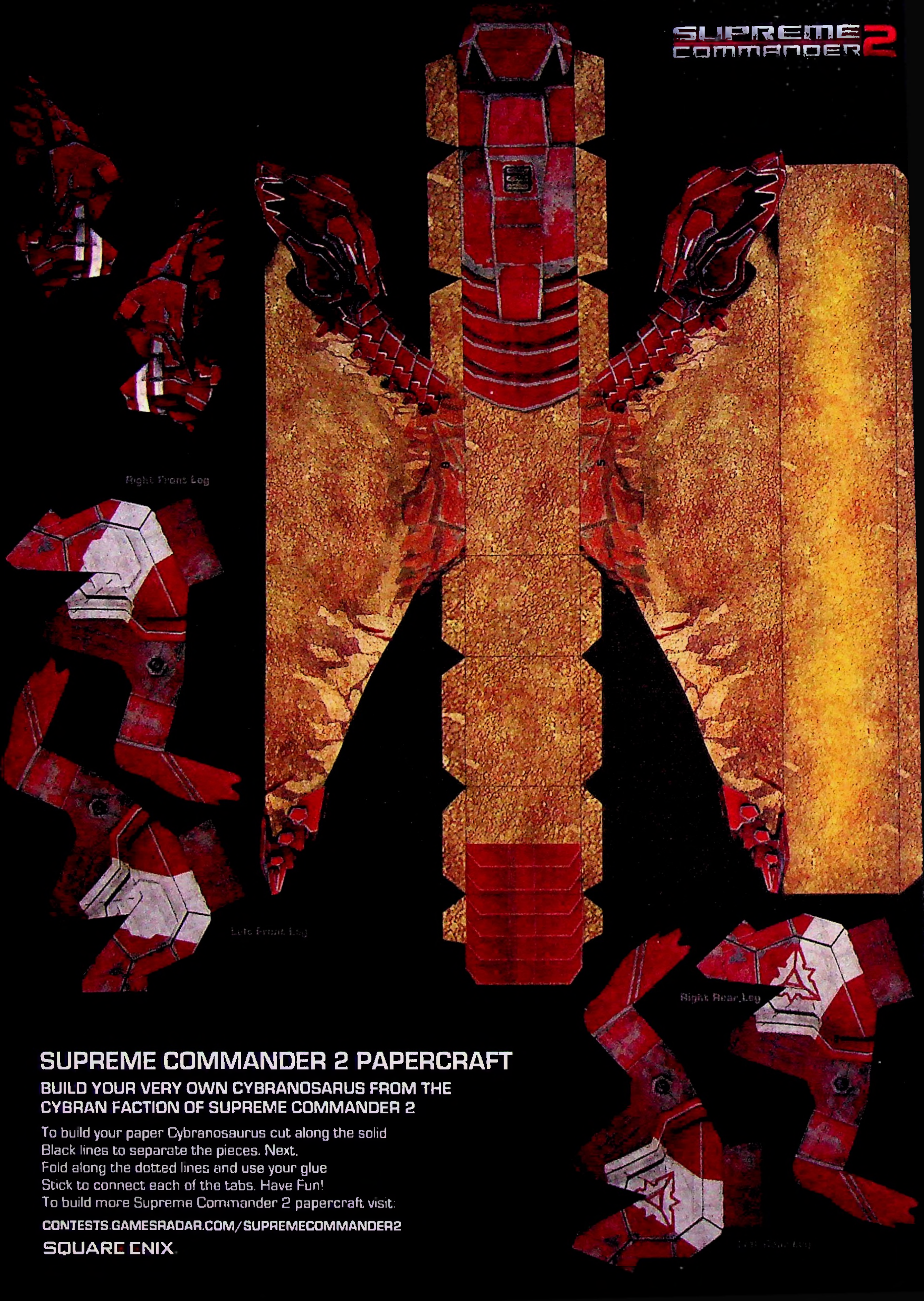
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SQUARE ENIX.

Nvidia's second-gen Ion is 40 percent smaller than its predecessor and plays 1080p Flash video.

Nvidia's Ion Updated

Nvidia's first-gen Ion chipset brought real gaming power to Atom N270- and N280-based netbooks—not enough to play Call of Duty 4, perhaps, but enough to run World of Warcraft or Quake 4. On March 1, Nvidia announced the second-generation Ion chip, which will work with Pine Trail netbooks and nettop devices. The new chips are 40 percent smaller than first-gen Ions, and incorporate 512MB of discrete DDR3 graphics memory. Nvidia's Optimus technology will switch between the Atom integrated graphics and Ion as necessary, to conserve battery life. Ion 2 will support Flash 10.1 and its hardware acceleration, and play 1080p Flash video. –NE

AMD 890GX Gets SATA 6

It's official: SATA 6 is here to stay. AMD has released a new 890GX chipset that, among other features, has native support for SATA 6 drives—and is the first chipset to offer it.

Native support is always preferred over discrete chips on motherboards because it gives you more ports, generally has fewer compatibility issues, and makes OS installation on a SATA 6 drive easier. Besides faster disk I/O, the 890GX also has the integrated graphics performance of a Radeon HD 4290 GPU, according to AMD. –GU

PERIPHERAL VISION

Thermaltake Gets into Games

Thermaltake will enter the gaming-peripheral market with its new Tt Esports product line, including the Challenger Gaming Pro Keyboard pictured here: a rugged-looking plank with up to 18 macro keys, an antighost key function, 64KB of onboard memory, integrated USB ports, and a gold-plated USB connector. The boards will be available this spring for $70. –KS

BYTE RIGHTS

QUINN NORTON

Their Own Personal Jesus

If you think writers never suffer for their readers, know that I just watched *2012* for you. Well, most of it. I'm only human. I was watching to see Jesus fall on Rio de Janeiro, the subject of the latest "Wow, this comedy just writes itself" copyright case in the news. The Catholic archdiocese of Rio de Janeiro is suing Columbia Pictures for destroying *Christ the Redeemer* in the movie *2012*—that's the famous statue of Jesus with arms outstretched over Brazil. The archdiocese is claiming the use, which it prohibited, to be copyright infringement.

2012 wasn't picky about destruction. Besides Christ, the movie lavishly wrecked Washington, D.C., and spent a lovingly long time dropping Los Angeles into the ocean. But the archdiocese didn't want the movie to offend its flock, and now it wants a statement from the studio saying it meant no offense, as well as "unspecified damages."

Apparently, Columbia Pictures pulled a classic "Mommy said no, let's go ask Daddy." The studio claimed it got permission to wreck Jesus from the estate of the sculptor, who died in 1961. After securing this permission "in good faith," they went ahead and knocked him over, once in an earthquake in the movie and then again for good measure with a tsunami on the movie poster. But thus far it's not actually clear who owns the copyright on this icon of Brazil and modern wonder of the world, and who could therefore be granting permission. It's a surprisingly common situation.

Establishing ownership on works that predate the 1970s but aren't old enough to be public domain can be a legal nightmare, as can works that might have been done as an employee of a company, or works done with online apps—sometimes other people's tools means other people's property, but you don't know that unless you read the terms of service, which you didn't. Sometimes uploading is enough to lose your rights. Look for more fights about who owns what—it's a century-old problem that's about to get a lot worse in the age of user-created content.

Quinn Norton writes about copyright for *Wired News* and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

THE LIST

Essential Gear on Our PC Workbench

4 ULTRA-X RST PRO 3 PCV-E The new burst mode on the RST Pro 3 memory tester uses multithreading to evaluate your RAM and get down to the root cause of those mysterious crashes.
$860, www.uxd.com

1
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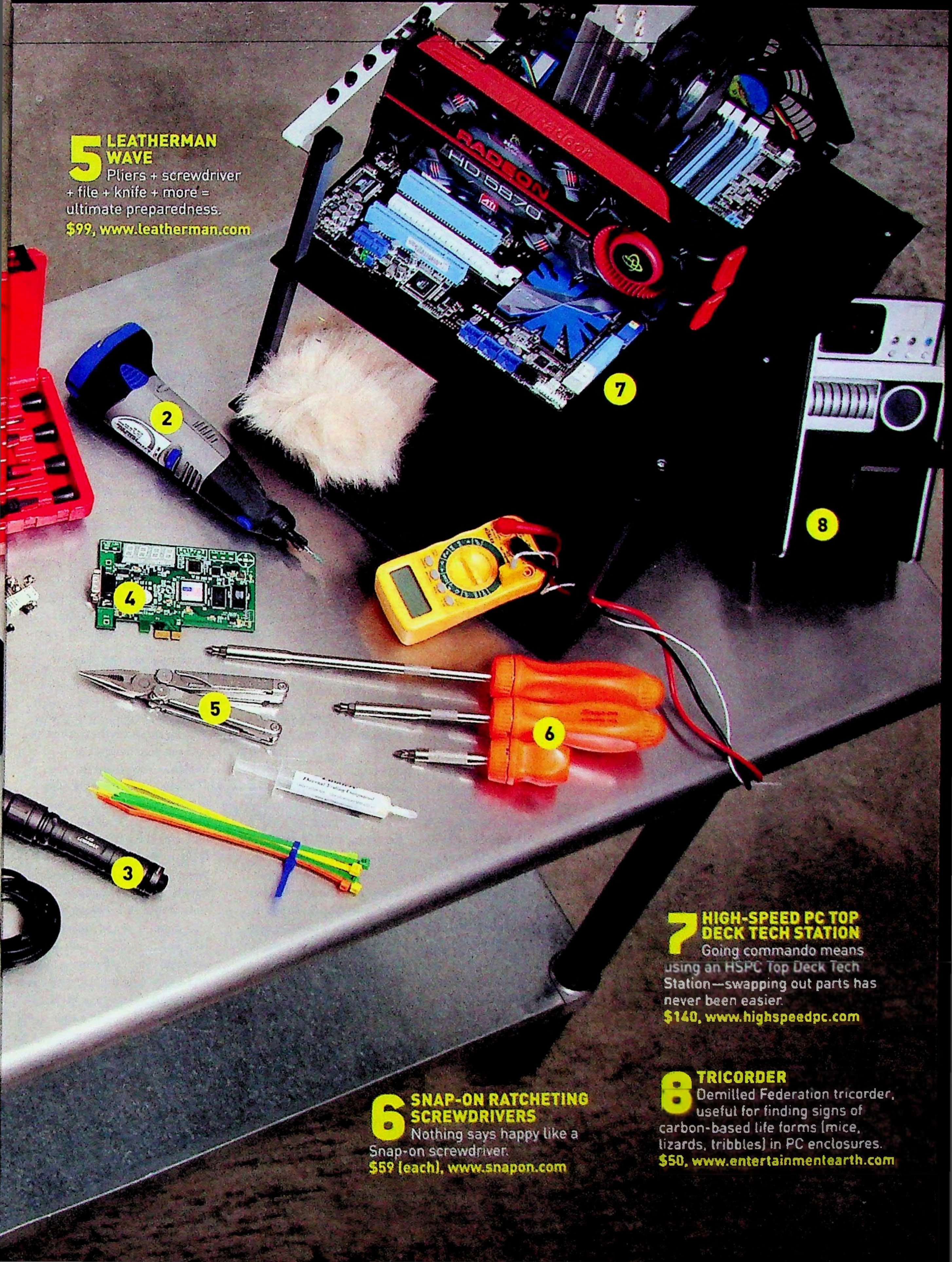

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8 TRICORDER

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$50, www.entertainmentearth.com

This month the Doctor tackles...

›Freezing While Gaming

›Sound Advice

›Vanishing Drive Space

Heat Freezes

Every time I play a game, I get the frozen-screen treatment—sometimes right away, sometimes a few hours in. I get a weird checkerboard pattern on the screen and I can't Alt+F4, Ctrl-Alt-Del, or anything else but a hard restart to get back to Windows. I'm running 32-bit Windows Vista, an AMD Athlon 64 6000+, a Sapphire Radeon HD 4870 Vapor-X, 4GB Kingston Hyper-X RAM, and two 1TB hard drives, all inside an Antec Nine Hundred case. I've tried running with the side of the case off and a fan blowing on the card, even though with the case closed I get cool air out of the back, so I doubt heat is the issue. I've reinstalled video drivers countless times and the forums don't seem to be much help since I haven't seen a thread describing the same error I get.

—Chris

Chris, the 4870 videocards are notorious for heat issues—even your intrepid Doctor has suffered from overheating-related crashes whenever the weather gets too warm, no matter how much airflow his GPU gets. The Vapor-X versions are supposed to be less susceptible to overheating given their larger fans, but we've still heard of them overheating. One solution we've found is to go into the Catalyst Control Center and manually increase the fan speed—we've found that 60 percent fan speed, though it sounds like a jet engine, will do the trick. Although heat is likely the issue, one thing you didn't mention was your power supply. A power supply that is going bad and not providing enough voltage to the graphics card could also be the source of your problem.

Win7 Can't Find X-Fi

I have an Intel Core i7-940 coupled with an Asus P6T Deluxe motherboard and 6GB of Super Talent DDR3/1333 memory. My OS is 64-bit Windows 7 Home Premium with Creative's X-Fi XtremeGamer soundcard. I bought an upgrade version of Windows 7 and ran the Windows 7 Upgrade Advisor; it said my audio device was not compatible. I downloaded the new Creative drivers and still got the same message. I have looked all over the Internet for a fix and I see a lot of people having the same problems with X-Fi cards.

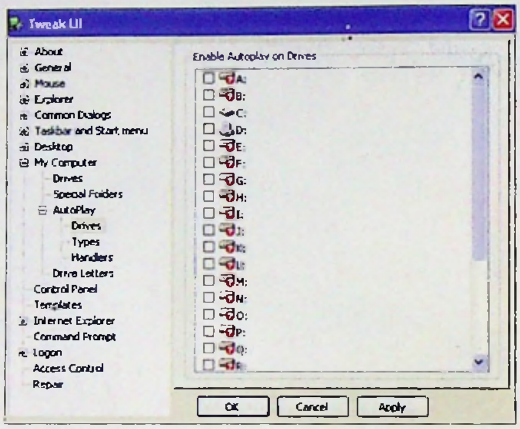
—William White

William, a few days after you sent your query to the Doctor, Creative posted a Product Identification Module Update on its website that will reportedly fix X-Fi identification issues in Windows 7. You can download it (and the most recent drivers) at http://bit.ly/cxj4R1.

AutoPlay, Go Away

I have an Acer laptop running Windows XP Professional SP2. When I plug in my USB drive, I get an "access denied" error. Accessing the drive through Windows Explorer doesn't bring up the error.

—Thuy Tran



Turning off AutoPlay can go a long way toward protecting yourself from malware that spreads via removable media.

Sounds like the result of AutoPlay trying to do something your computer isn't expecting. This is how viruses spread, so the first thing to do is disable AutoPlay on your USB ports—this is good practice for anyone. To do this in Windows XP, download and install the Tweak UI PowerToy from Microsoft (http://bit.ly/18bITO). Run Tweak UI, then in the menu tree, expand My Computer, then AutoPlay, then click Drives. Uncheck any drive letter you don't want AutoPlay using—we usually deselect everything but the optical drive. Then hit OK.

Now, plug in your USB drive. The access-denied error should not appear. But let's dig a little deeper. Use your antivirus software and Malwarebytes' Anti-Malware to scan your USB drive for infections. Next, we're going to check out the autorun entry on your device. Use Explorer to access the drive, go to the menu bar and hit Tools > Folder Options. Click the view tab, then click "Show hidden files and folders." Uncheck "Hide protected operating system files" and hit OK. Then, back in Windows Explorer's view of your USB stick, right-click autorun.inf and open it with Notepad. Make a note of whatever files it references, and if they're on the USB stick and you don't recognize them, delete them, then delete autorun.inf, just to be on the safe side. You should also consider updating your Windows XP installation to Service Pack 3 for greater security and reliability.

Holy Shrinking Free Space, Batman!

The hard drive in my recently built computer keeps filling up without explanation. I am

running 64-bit Windows 7, an Intel Core i7-920, an MSI X58 PRO-E motherboard, 6GB of DDR3, and a Seagate Barracuda 7200.12 TB hard drive. I have 625.1GB free out of 931GB. When I came home a couple days ago, I found that I had only 17KB free on my hard drive. I restarted my computer to find that the levels of free space had returned to normal. I then locked my computer and went out for a meal. When I came back, I found I only had 234.7GB free. Every time I shut down the computer, the level of free space goes to normal, but then decreases rapidly whenever my computer is on.

I ran WinDirStat to try to figure out what the problem was; it showed that the largest chunk of used space—157GB!—was being used by a file called cputime.xml in C:\Program Files (x86)\Common Files\PC Tools\Monitor.

—Joseph Koo

IF YOU HAVE THE MONEY TO INSTALL WINDOWS 7 ON A SOLID STATE DRIVE, WE SAY, GO FOR IT

Joseph, this is a known issue with software from PC Tools, such as Registry Monitor and Spyware Doctor, and has been fixed in the latest versions. Go to the Task Manager and end the SSDMonitor.exe and startmansvc.exe processes, then delete cputime.xml and logfile.etl from the "s? monitor" folder. Now, uninstall your PC Tools software and reinstall the latest version, and you should be all set.

Which Port?

Thanks to *Maximum PC's* past advice, I have a new rig with an ATI Radeon HD 5870 graphics card. It has dual DVI, HDMI, and DisplayPort connections. I use my rig for photography and video editing. I have a 24-inch Dell monitor with all of the above ports. Which is the best one to use and why?

—Preetham Grandhi

Based on what we know of Dell's 24-inch monitors, it doesn't matter which connection you use, and will mostly depend on which cable you have handy. If you had a monitor with built-in speakers, you would want to opt for HDMI, which carries both a video and audio signal. It's also true that monitor makers don't always include HDCP (High-Bandwidth Digital Content Protection) on all ports—HDCP is necessary for watching copy-protected Blu-ray movies—in which case, you would also want to opt for HDMI, which offers that feature. But in the case of Dell's 24-inch monitors, it's our understanding that HDCP is present in all ports.

Do I Have a Bigger Issue Here?

My PC has an Intel 2.4GHz Core 2 Quad Q6600, an EVGA 750i FTW motherboard, and two sticks of GSkill DDR2 with timings of 5-5-5-15 2T at 1,066MHz. Two weeks ago, I started getting random lockups and blue screens. After a lot of work, it turns out to be the RAM, which is producing errors in Memtest. However, in testing it I have found that I am getting errors in unlinked mode, at 800MHz, undervolting, overvolting, and moving the RAM around. The only time I don't get errors is when I run just one stick of RAM. Is this actually a RAM problem or do I have a bigger issue?

—Tyler Cook

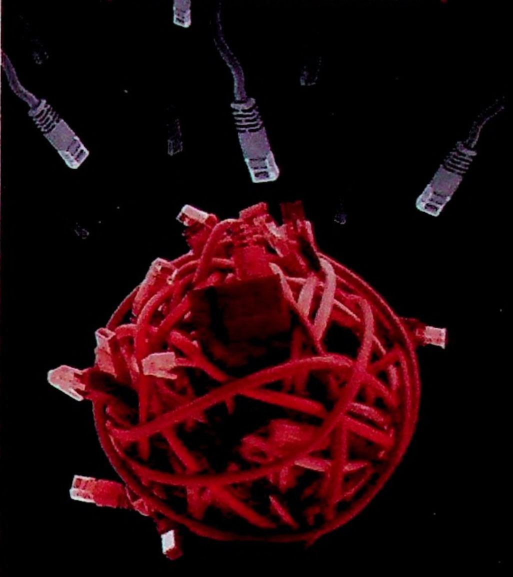
The Doc suggests that you move a DIMM that has tested good around to the different slots to see if it's a particular slot that's bad. This can happen when dust or other debris gets lodged in the slot. Try cleaning the slots out with a can of compressed air and running your test again. If you still run into issues, the fault may lie with your motherboard or even your CPU. Electronics do, sadly, go bad, especially if they have been abused from overclocking or exposed to extended periods of overheating.

Upgrading Advice

I'm trying to decide whether to upgrade from Windows XP Professional to Windows 7 Professional. While I'm no hardcore techie, I can follow directions well and I built my own system a couple of years ago with the thought of having a system ready for a

SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the flames. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

[IT'S IN YOUR GENETICS]



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AMD

Be careful when cleaning CPUs that don't have heat spreaders—they're surprisingly easy to break.

future OS upgrade. My system is an Asus P5E Deluxe, an Intel Core 2 Quad Q6700 at 2.66GHz, and 4GB of DDR3. I have Windows XP installed on a 150GB Western Digital Raptor, as well as a 500GB secondary drive.

Although I have some programs installed on the C: drive (ones I can reinstall), most of my programs have been installed on the secondary drive.

I have plenty of room on the C: drive to partition and install Win7, but I'm thinking about buying an SSD to install Windows 7 on. I use Adobe Photoshop CS4 and Painter 11, as well as Adobe Premiere Elements 8, and I think I would benefit from installing 64-bit Windows 7 and adding 4GB to 8GB more RAM.

I'm really unsure as to how to go about this and not sure I really want to—I've read a number of posts on different forums and it seems to me there are mixed feelings about the upgrade.

Also, since my programs are installed on a drive other than my OS drive, if I make a change by partitioning or installing Win7 on a new separate OS drive, would I be able to use the programs already installed on the D: drive without reinstalling them?

—Tom Helinski

Tom, you'll generally want to reinstall your programs every time you change operating systems—they may be unstable otherwise. However, we've found that sometimes programs installed on non-OS drives function fine without a reinstall. You'll definitely want to reinstall your Adobe suite, though—just remember to deactivate your old install before you upgrade.

As for your question, if you have the money to install Windows 7 on an SSD, we say, go for it—as long as you have an SSD with TRIM support for clearing deleted blocks. You'll have to think hard about where you want your scratch disk for Photoshop and Premiere Elements, though—lots of random writes will cause some SSDs to stutter and slow down. Look for an SSD with an Indilinx Barefoot controller and TRIM support. Also, multilevel cell (MLC) SSDs can tolerate fewer read/write cycles than SLC SSDs, although a quality MLC SSD should still last at least as long as your average mechanical hard drive, even with steady use.

Alcohol and Nude Parts

Is it OK to use alcohol to wipe clean an Athlon CPU without a heat spreader?

—Avery Sio

Yes, the doctor has successfully cleaned many old spreaderless Athlon and Athlon XP CPUs using alcohol. It's generally recommended that you use 99 percent isopropyl alcohol—or even better, use a CPU cleaner such as ArctiClean to get the job done. Remember, those old Athlons and Athlon XPs can be easily damaged since there's nothing protecting the core, so don't be too forceful.

BIOS Fear

Are there any benefits to flashing or updating a PC's BIOS? Are there any dangers to my machine by doing this?

—Andrew Wilson

Andrew, there are many potential benefits to updating your BIOS. BIOS updates typically include performance increases and support for hardware that was not available when your motherboard launched—like new CPUs and memory. A BIOS update can also improve stability and correct bugs that the mobo maker has found since the board was released. *Maximum PC* endorses keeping your motherboard BIOS up to date. Most modern motherboard vendors make BIOS-flashing utilities that can run from inside Windows—these are available for free from their support websites; otherwise, you'll have to boot from a floppy disk, USB drive, or CD.

There are potential dangers to flashing your BIOS, of course—a botched upgrade can totally bork your PC. Still, flashing a BIOS today is not as scary as it was 10 years ago as many board vendors have recovery mechanisms in place. Some even have backup BIOSes should one fail. ⏻

SECOND OPINION

Hardware Virtualization Denied

In the March 2010 issue you answered a question about upgrading a laptop CPU to support virtualization. It is important to realize that you must be certain not only that the CPU supports hardware virtualization, but that the system's BIOS does as well.

I recently purchased an Acer Aspire 1810T laptop that has an Intel Core 2 Duo SU7300 processor. I intended to run Virtual XP in Windows 7 Professional to support legacy business apps. There is no question this processor supports hardware virtualization. However, I was disappointed to find out that there is no way to enable virtualization on this machine, as there is no option to do so in the BIOS. Unfortunately, hardware virtualization is disabled by default.

Make sure your PC's BIOS supports hardware virtualization if you are buying or upgrading expressly for that feature. —DAN GOLDING

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For the Kill!

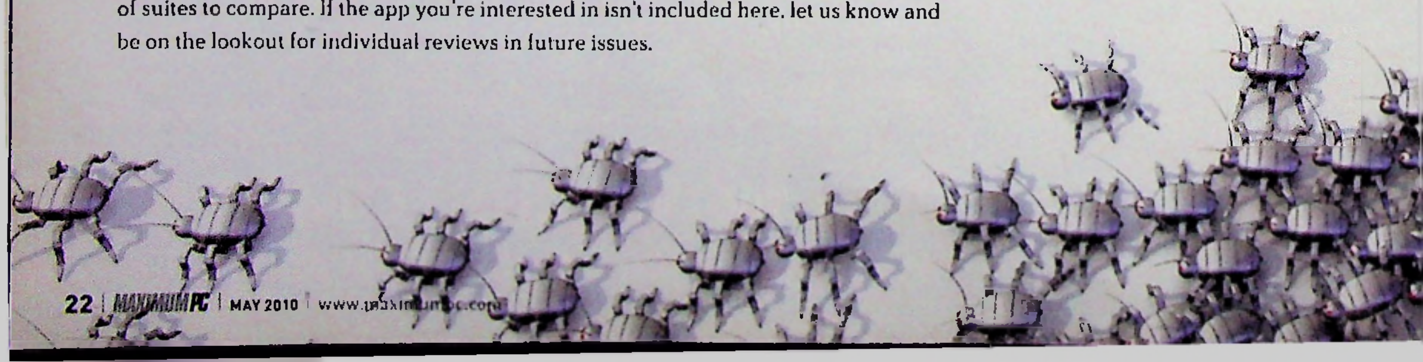
We test 10 popular antivirus apps to find out which are best at defeating today's myriad malware menaces

BY PAUL LILLY

Once upon a time, the typical computer virus was annoying, and even a little destructive, but nowhere near as dangerous as what computer users face today. The stakes are much higher now, and if you're not careful or haven't taken the proper precautions, you're a sitting duck for hackers to steal your identity and sell your private information to the highest underground bidder. Imagine waking up to find your bank account drained or your credit destroyed. And lest you think we're exaggerating, consider that most U.S. military personnel aren't even allowed to tote USB thumb drives and other removable storage devices anymore because of the potential harm of a virus outbreak.

The solution to all this is to not be caught with your virtual pants around your ankles, and lucky for us, antivirus vendors have stepped up their game with increasingly robust all-in-one security suites. In fact, unlike other technology categories, the field of AV continues to expand rather than consolidate, with an overwhelming number of apps promising protection and unique features. That's where we come in.

To help you sift through the cruft, we're going to revisit the latest versions of the antivirus apps that showed the most promise (or have been granted a mulligan) from last year's roundup (January 2009), and we'll pit them against five of the most reader-requested antivirus suites we haven't yet reviewed. You'll notice we've narrowed our focus to only two freebie apps this time around (Avira, last year's champ, and Microsoft Security Essentials, Redmond's highly anticipated replacement to Windows Live OneCare), so if you do decide to shell out for paid software, you'll have a wider variety of suites to compare. If the app you're interested in isn't included here, let us know and be on the lookout for individual reviews in future issues.



Putting AV to the Test

For AV software to make the grade, it has to excel in each of these five areas

SYSTEM PERFORMANCE AND SCAN SPEED If there's one thing we learned from last year's roundup, it's that not all security suites are as lean as they claim to be. Nor are all of them speedy. To separate the praiseworthy from the pretenders, we look at what effect each AV app has on our system resources, as well as subject each one to a full PCMark Vantage run and compare the results to that of a pre-AV state. We also evaluate how long it takes each security suite to sweep through our system, since an after-hours scan isn't always an option.

ANNOYANCE We fully expect to spend a little time configuring our security options and digging through the advanced settings when we first fire up our AV software, but once we're finished tweaking, we don't want to be bothered. Security software shouldn't subject us to useless pop-ups and benign notifications.

FEATURES AND IMPLEMENTATION It can be a tough sell convincing users they should shell out for a security suite when free alternatives abound. But let us be clear about one thing: We're not looking for which AV solution can cram the most bullet points on the side of the box. We do expect a certain baseline feature-set—spam blocking, spyware protection, real-time scanning, etc.—but we're also looking for any unique (and useful) additions, as well as how intelligently they're integrated.

PRICING If we're being totally honest, PC users can be a stingy bunch. Don't believe us? Then explain why BitTorrent is so popular (and no, it's not because everyone is in a rush to download the latest Linux distro). Freebie alternatives hold a clear advantage in this category, but we're willing to concede the value of an effective, all-in-one security suite over piecing together a mish-mash of free antimalware products. The prices for all the paid apps featured here pertain to a one-year license.

VIRUS DETECTION This is really what it's all about, and to determine the overall effectiveness of each AV app, we take a multipronged approach. First, we fire off a pair of synthetic spyware and virus tests courtesy of www.spycar.org and www.eicar.com. This is followed by a bombardment of our own collection of malware. Finally, we hit up the seedier side of the web with reckless abandon.

Once we're finished with our in-house testing, we compare the results with those of Virus Bulletin (www.virusbtn.com), an independent testing lab. We also take into consideration whether an app has consistently performed well year after year.

NORTON INTERNET SECURITY 2010

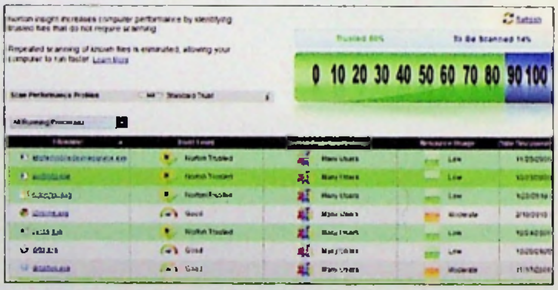
Fast, finely tuned, and a little flawed

We took some heat after awarding last year's version of Norton Internet Security our coveted Kick Ass award. Some of you were baffled at how Norton, a notorious resource hog and semi-effective scanner, could turn things around in such dramatic fashion. Others questioned our geek cred, while a few of you even accused us of being on the take—ouch. But the truth is, Symantec deserved every accolade it received. Could this be the dawn of a new AV dynasty in the Norton camp?

We're not yet ready to anoint Norton the savior of security software, and we'll tell you why in a moment. First, let's focus on what NIS 2010 does right. This year's update continues NIS's reborn legacy as a lean and fast scanner. We remain particularly impressed with Norton Insight, which dramatically reduces system scans. The first time NIS sweeps through your system, it examines every file. Each time thereafter, the scanner skips files that have been validated by Symantec and deemed trustworthy. The result? After an initial scan time of 16 minutes, 18 seconds, NIS then scurried through our data in just four minutes, 47 seconds, finishing long before our coffee break did.

NIS thwarted most of our attempts to find a chink in its armor, knocking out spyware and batting away disreputable downloads without skipping a beat. That is, until we played dirty. We disabled NIS long enough to download a contaminated archive and then turned it back on. Norton only blocked some of the infected files inside our Pandora's box, allowing our test bed to become infected with a fake AV scanner. It even allowed the rogue program to disable UAC.

We have a hard time picturing anyone going through the trouble we did to intentionally inflict harm, but nevertheless, our confidence is shaken.



Norton lets you audit your system files and see which ones might be potentially dangerous or performance-hampering.

🟩🟩🟩 VERDICT

NORTON INTERNET SECURITY
$70 (3-PC license), www.symantec.com

7

ESET SMART SECURITY 4

This newest version brings more of the same, and we're OK with that

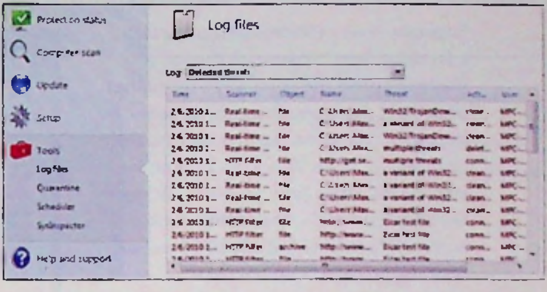
Like Norton, ESET Smart Security walked away with a Kick Ass award in last year's roundup, so we were eager to see how the two security suites would compare when pitted against each other in our second annual AV battle royal.

Through the first few rounds of testing, it was near impossible to declare a winner. Both apps remained light on their feet by barely sipping system resources before the two began trading blows. ESET won a round by adding six fewer seconds than Norton did to our system boot time (+14 seconds versus +20 seconds, respectively), but Norton's a more polished fighter. What do we mean?

ESET lacks a few features found in Norton, including identity protection and parental controls. And while ESET managed to scan our test bed in a little less than eight minutes, which is half the time it took Norton during its first run, ESET doesn't skip over trusted files to reduce subsequent sweeps, so it's not nearly as fast in the long run.

But just when it looked like Norton might squeak out a victory, ESET threw an uppercut from which Norton never recovered. Unlike its rival, we weren't able to dupe ESET into letting us turn our test bed into a haven for pop-ups. We tried the same tactic that stymied Norton—disabling the AV software just long enough to download an archive brimming with malware—but ESET stopped us dead in our tracks before we could unleash a flurry of trouble onto our hard drive. Bravo!

There really isn't much to fault in ESET. Not a whole lot has changed since last year's version, and in this case, that's not a bad thing. Experienced users will still find a plethora of options in the advanced menu, and malware still stands little chance of running amok.



Enable the Advanced mode to gain access to things like the Task Scheduler and information about quarantined files.

🟩🟩🟩 VERDICT

ESET SMART SECURITY 4

$60, www.eset.com

9

AVIRA ANTIVIR FREE EDITION

A serviceable solution if you supply your own smart computing habits

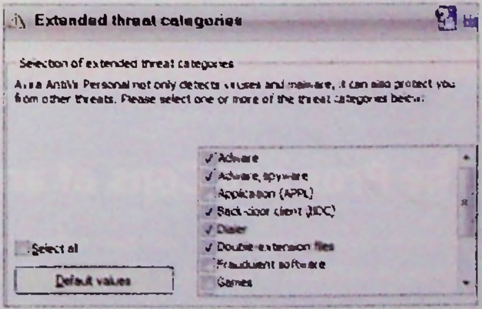
Ask any penny-pinching power user what he thinks about non-free security suites, and he'll tell you it's a fool's solution, plain and simple. After all, what's the point of paying for AV software when programs like AntiVir offer the same protection sans a price tag?

A valid question, so we set out to answer it. We combed through the data available from two well-known independent testing labs—Virus Bulletin and AV-Comparatives—and in both cases, we found that AntiVir historically performs well, boasting high detection rates. So far, so good.

Even better, AntiVir added a bit of basic spyware protection to this year's version, addressing one of our primary complaints about AntiVir in 2009. Repeating some of the same tests we used last year, this year's AntiVir did a much better job protecting IE from rogue code and prevented a few other spyware shenanigans, such as altering our host file.

But it wasn't all peaches and cream. Based on AntiVir's track record, we didn't expect to run into too much trouble with Trojans. We were wrong. When attempting to download the same dirty archive we used throughout this roundup, AntiVir failed to detect any of the several payloads inside. Moments later, our test bed was in pretty bad shape. The various viruses disabled UAC, knocked out access to the Task Manager, and even managed to block AntiVir from running a scan.

Based on our in-house testing, it's tough to recommend AntiVir if you're installing AV software for family for friends. But for power users who don't plan on putting themselves into too many precarious situations, like romping around the web's dark alleys and searching for software via P2P, AntiVir still deserves consideration. Its ultra-low footprint makes it a serviceable option for anyone who doesn't want to sacrifice performance; just be sure to tread carefully.



Selection of extended threat categories

Avira AntiVir Personal not only detects viruses and malware, it can also protect you from other threats. Please select one or more of the threat categories below:

☑ Adware
☑ Adware, spyware
☐ Application (APPL)
☑ Back-door client (BDC)
☑ Dialer
☑ Double-extension files
☐ Fraudulent software
☐ Games

AntiVir's Expert mode unlocks a bevy of options you wouldn't expect to find in a freebie security app.

🟩🟩🟩 VERDICT

AVIRA ANTIVIR FREE EDITION

Free, www.free-av.com

6

MICROSOFT SECURITY ESSENTIALS

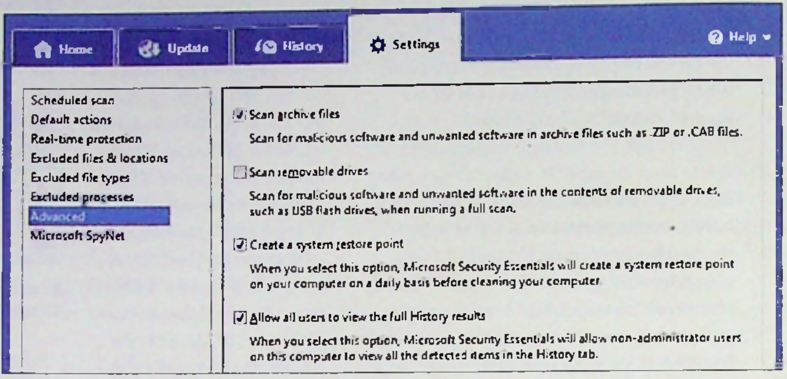
Windows Live OneCare reincarnated for the masses

Someone over at Microsoft must watch a lot of hockey, because it's the only way to explain the company's recent hat trick. First there was Bing, the much-improved "decision" engine that replaced Live Search. Then Windows 7 launched, atoning for Vista. Now we have Microsoft Security Essentials, one of the latest entries into the field of AV, and another winning product from Microsoft.

Essentials scored points with us right off the bat with its supersonic 10-second install time. Even after downloading the latest update, we still hadn't invested more than a minute or so of our time. And while Vista, Internet Explorer, and other Microsoft software made it easy at times to rag on Redmond for poor resource management, there would be none of that with Essentials, which disappeared quietly into the background.

When it came time to test Essentials, we checked our expectations at the door but were nevertheless pleasantly surprised. Essentials sailed through our synthetic spyware and virus testing without so much as flinching and fared equally well at thwarting our attempts to inflict damage with genuine payloads.

Microsoft did leave plenty of room for improvement, however; most notably in the swiftness of the scan engine, or lack thereof. Scanning just 60GB of data took nearly 17 minutes, and that time never improved with subsequent sweeps. That's more than five times longer than it took AntiVir—the only other freebie AV app in this roundup—to sift through the same files.



☑ Scan archive files

Scan for malicious software and unwanted software in archive files such as .ZIP or .CAB files.

☐ Scan removable drives

Scan for malicious software and unwanted software in the contents of removable drives, such as USB flash drives, when running a full scan.

☑ Create a system restore point

When you select this option, Microsoft Security Essentials will create a system restore point on your computer on a daily basis before cleaning your computer.

☑ Allow all users to view the full History results

When you select this option, Microsoft Security Essentials will allow non-administrator users on this computer to view all the detected items in the History tab.

Microsoft's no-fuss approach to security means there isn't a whole lot for power users to tinker with.

We'd also like to see Microsoft offer power users more fine-grain control over the settings. The basics are there, like setting up scheduled scans, and you can choose whether or not to enable real-time protection. You can even tell Essentials to skip certain files and locations. But good luck trying to dig any deeper than that. For instance, you're not able to configure the real-time module to act more aggressively if there's a virus outbreak going around, like the Conficker scare, nor dial things down if it starts picking up too many false positives.

These are minor quibbles when you consider that Essentials won't tax your wallet or your system, while still getting the job done. If you're a gamer who'd rather spend $60 on a triple-A title than security software, does anything else really matter?

🟩🟩🟩 VERDICT

MICROSOFT SECURITY ESSENTIALS

Free, www.microsoft.com/Security_Essentials/

8

🟩🟩🟩 CLOUD-BASED SCANNING

The Pros and Cons of an Internet-Based AV Approach

We get it—you're a power user who pushes the limits of your PC, and you're not about to stuff a full-blown security suite into your finely tuned rig, no matter how lean the footprint might be. After all, if you're not doing anything risky, then you have little to worry about, right?

Fair enough, but keep in mind there are some things that are simply out of your control. USB keys, digital photo frames, and even driver discs have been found to contain malware. So even if you refuse to install AV software, you should consider turning to the cloud once a month.

Almost every major AV vendor offers free online scanning, but there are pros and cons to this approach. On the plus side, cloud-based scanners tend to always be up to date, and because you're not installing any software, there's nothing to rob your system of any resources. Groovy, right? Not so fast, Peter Brady. By relying solely on the cloud, there's nothing to stop your system from becoming infected in the first place, whereas taking a proactive approach effectively puts up a wall against malware.

When it comes to checking out just a file or two, we especially like Virus Total (www.virustotal.com). After you upload the questionable file, Virus Total taps into 40 different updated scan engines, so if the file turns out to be dirty, there's a good chance one of the engines will catch it. For more comprehensive scanning, head over to Panda ActiveScan 2.0 (http://bit.ly/2T0ite).

AVAST! INTERNET SECURITY

Still too slow to take seriously

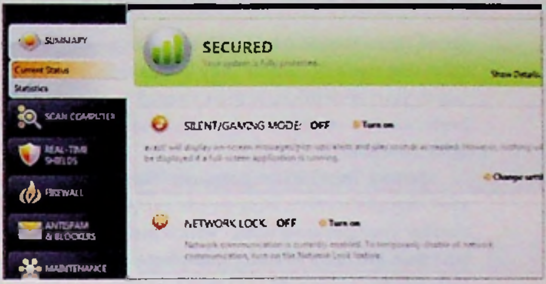
Our last experience with Avast! left us utterly annoyed, and for good reason. It was slow, resource-heavy, and seemed to suffer from an identity crisis, with a quirky user interface that looked more like a media player than an AV scanner.

That was the free version we looked at, and this year, we put Avast!'s full-blown security suite under the microscope. A close inspection reveals that some of our previous complaints remain, but there have also been a handful of welcome improvements.

For starters, Avast! sports brand-new digs, and it's never looked better. Gone is the goofy media-player façade, replaced by a sleek UI that's easy to navigate. All the controls are clearly labeled, so you won't spend time fumbling around looking for things like the IM shield or firewall.

Initially, Avast! did the best job out of the bunch at blocking most forms of malware. If we clicked a link containing malicious code, not only did Avast! stop the script from executing, it also disabled the website to prevent us from doing any harm. But when we turned our attention to seedier sides of the web, Avast! allowed us to download a dirty archive brimming with infectious files and failed to detect any of the payloads inside. Where Avast! somewhat redeems itself, however, is with its sandbox mode. Accessible through the right-click context menu, you can run any file in a virtual environment, including your browser, and then kill the process if it turns out to be a virus. If you remember to use it, it's like having a persistent undo button.

But for all of Avast!'s improvements, it's still saddled with the slowest scan engine of the bunch, taking twice as long to scan our test bed as the next-slowest security suite.



SILENT/GAMING MODE: OFF

NETWORK LOCK OFF

Turn on Avast!'s Gaming Mode to disable pop-ups while you're busy fragging your friends.

VERDICT

AVAST! INTERNET SECURITY

$60 (3-PC license), www.avast.com

5

MCAFEE INTERNET SECURITY 2010

The Rodney Dangerfield of AV finally earns our respect

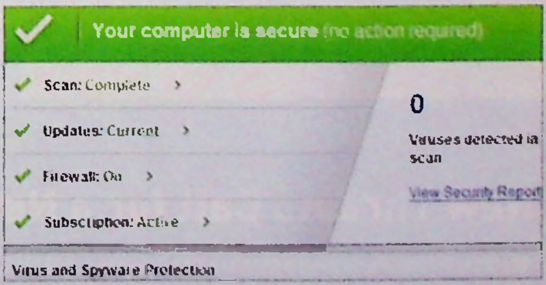
When McAfee told us it completely re-engineered its security suite from top to bottom, we agreed to include it in this roundup knowing full well we had probably been duped like the guy who drives off the used-car lot without a warranty. We were wrong.

To our eyes, this is a completely revamped McAfee. MIS 2010 rolls off the lot with a much-improved UI over previous versions, and manages to balance ease of use with a high level of customization. For those who care to do so, McAfee makes it easy to dig deeper into each of the main menu's modules, but you'll never feel lost or overwhelmed.

Underneath the hood sits a more performance-oriented engine than what you would expect from a McAfee product. Where last year's version felt like a dilapidated Pinto, the 2010 model has all the makings of a sporty sedan. To reduce the time it takes to scan a system, McAfee caches files and puts together a white list of files it can safely skip. Depending on how clogged your hard drive is, McAfee claims this can result in up to eight-times-faster scans (we saw a 50 percent improvement).

Adding value to an already fleshed-out security suite, McAfee includes a few thoughtful extras, including 1GB of online backup space. There's also a QuickClean module, which streamlines the process of deleting temporary files, and a file shredder for more securely deleting your data.

McAfee cruised through our malware tests with little incident—that is, until it let a malicious file write a registry entry blocking access to the Task Manager. To McAfee's credit, it did neutralize the actual virus responsible, but the fact that it let a program write to our registry worries us, and cost the product a 9 verdict and a Kick Ass award.



Your computer is secure (no action required)

✓ Scan: Complete ›

✓ Updates: Current ›

✓ Firewall: On ›

✓ Subscription: Active ›

0

Viruses detected in scan

McAfee's redesigned home screen now includes a big green bar intended to give you warm fuzzies when your system is free from malware.

VERDICT

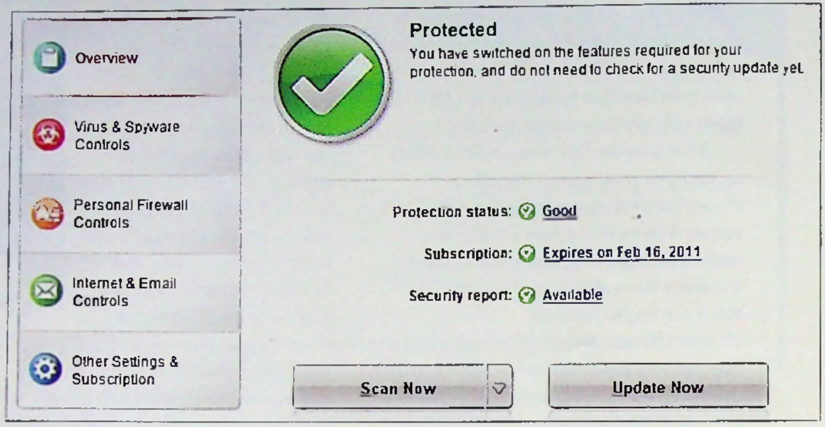
MCAFEE INTERNET SECURITY

$50 (3-PC license), www.mcafee.com

8

TREND MICRO INTERNET SECURITY PRO 3.0

The high point of this foul program is its 30-day money-back guarantee


Overview
Virus & Spyware Controls
Personal Firewall Controls
Internet & Email Controls
Other Settings & Subscription
Scan Now
Update Now

Protected

You have switched on the features required for your protection, and do not need to check for a security update yet.

Protection status: Good

Subscription: Expires on Feb 16, 2011

Security report: Available

Trend Micro's dashboard is simple enough, but takes longer to load than other security suites.

Trend Micro should come with a warning label that reads, "Caution: May be hazardous to your system's boot time, overall performance, and system security. Use at your own risk."

Instead, Trend Micro promises "the most comprehensive, easy-to-use protection for your personal data," which just isn't true. We have so many complaints its tough to decide where to begin, so let's start with system performance.

Trend Micro added more than half a minute to our test bed's boot time—long enough for some PC components to become obsolete. It also turned in the lowest PCMark score, although there were other products with scores nearly as bad.

We're far less forgiving of the hoops you have to jump through to visit a blocked site. On one hand, Trend Micro does an excellent job of creating a barrier between you and a malicious website. But if Trend Micro tags a clean site as dirty, you might as well go pound sand. Blocked sites come with a disclaimer that's supposed to allow you to click through after acknowledging you understand the risk, but in most cases, all that does is reload the same warning message. Alternately, you can label the site as trusted by clicking the green button on the installed toolbar, but you can't refresh the page—you need to manually type in the URL. Even then, only the main page will load; all subdomains remain blocked. The solution? Fire up Trend Micro's slow-loading main console, click your way through to the list of approved websites, add the domain, click the "Include all pages of the websites selected" checkbox, apply the changes, and then restart your browser. Egads!

There are plenty of other quirks, like having to close the console before you're able to view quarantined files, but the worst part about all this is that you're still susceptible to infection. Trend Micro started off strong, but rolled over and played dead when we unleashed our archive from hell. The Task Manager disappeared, we were cut off from the registry, and a fake AV scanner kept imploring us to cough up our credit card.

Our time with Trend Micro wasn't all bad, and there were some bright spots, but none brighter than the 30-day money-back guarantee.

VERDICT

TREND MICRO INTERNET SECURITY
$70, www.us.trendmicro.com

4

ON THE CASE

New Threats Call for a New Breed of Antivirus

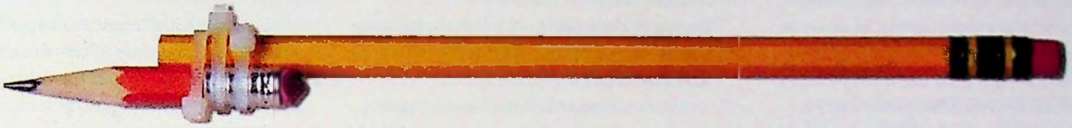
Most tech historians credit Richard Skrenta for having written the world's first computer virus. At the time a 15-year-old freshman in high school, Skrenta wrote what would be called "Elk Cloner" on an Apple II computer as a practical joke.

Today, there are more than a million viruses in the wild, but it's not just the sheer numbers that pose a problem for antivirus programs. The biggest issue for AV software is how to detect a virus strain never before seen, and the stakes couldn't be higher. Worms like Conficker end up costing corporations millions of dollars while continuing to evolve at a rapid pace.

It's no longer enough to simply update AV definitions when new threats are detected, and while pulse updates—minor updates throughout the day rather than one big one every 24 hours—have helped, AV vendors have had to get just as creative as the hackers they're trying to combat. AV apps now employ heuristic scanning, whereby the scan engine looks at certain instructions or commands that are out of the ordinary. A good scanner will also look for signs of suspicious behavior, such as attempting to change security settings or copying files to system directories. When it detects pieces of code or behaviors that aren't consistent with how most clean programs operate, it's a red flag that something malicious might be going on.

In the end, the best line of defense is still you, the user. Rely on smart computing first and your AV software second.

There are many different ways to save.



TR2 Series

There are many different ways to save. But value doesn't necessarily mean you have to skimp on reliability or performance. Thermaltake's TR2 series of power supply is designed with value and performance in mind. With Thermaltake's state-of-the-art circuitry design capability and advanced packaging technology, it is able to provide the same level of high efficiency and power protection that you have come to expect from Thermaltake's full range of power supply. All TR2 series power supply carry an industry-leading 5 Year Limited Warranty for the ultimate piece of mind. For more Information, please visit www.thermaltake.com

*80 PLUS®, NVIDIA® SLI and ATI™ CrossFire™ X certifications are available on select models.

Become our fan & follow us: facebook.com/ThermaltakeInc, twitter.com/Thermaltake, myspace.com/ThermaltakeUSA, youtube.com/ThermaltakeReview, flickr.com/ThermaltakeInc

Thermaltake
COOL ALL YOUR LIFE

DELL RadioShack MICRO CENTER Fry's BEST BUY COMPUSA amazon.com TigerDirect.com

BITDEFENDER INTERNET SECURITY 2010

This security suite has more personalities than Robin Williams

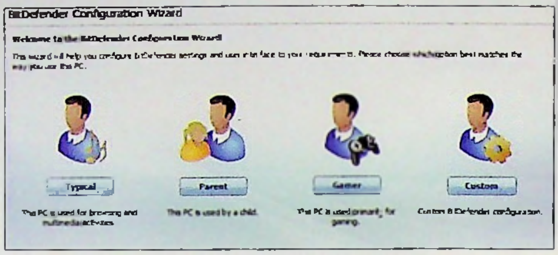
Ever been blindsided by what you thought was love at first sight, but turned out to be just another pretty face? Eventually you find yourself at a crossroads having to decide whether to break things off, or stick around for the fast ride and ignore the flaws.

Such is the position BitDefender puts you in, and you'll ultimately have to make the same decision. Right off the bat we encountered a couple red flags of things to come, including a somewhat lengthy install time requiring a restart, and mandatory registration in order to activate the license.

Once we got past the initial awkwardness, BitDefender proceeded to sweep us off our feet by tailoring itself to our needs. BitDefender's configuration wizard asks you to select from four different layouts based on what type of user you are, including Typical, Parent, Gamer, or Custom. Should you later change your mind, you can rerun the wizard with a click of the mouse.

Power users will want access to all the bells and whistles, and there are plenty of them. But if you're installing BitDefender on Aunt Mildred's machine, you can opt for a super-simple layout, effectively sweeping all the fine-grain controls under the rug in favor of a user-friendly dashboard. There's even a middle option for folks who want a little more control but not the whole kit and caboodle.

But underneath BitDefender's pretty face are a few niggling annoyances. Surfing the web suddenly felt laggy, and BitDefender failed five of Spycar.org's 17 spyware tests. It fared much better during our real-world virus attack, though it did let a rogue program cut off access to the Task Manager.



BitDefender Configuration Wizard

Welcome to the BitDefender Configuration Wizard

The PC is used for browsing and multimedia activities.

The PC is used by a child.

The PC is used primarily for gaming.

Custom BitDefender configuration.

BitDefender allows you to choose from one of three preset profiles, or create your own custom layout.

Even still, BitDefender's super-fast subsequent scan time of two minutes, 30 seconds smoked most of the competition and had us rethinking our priorities, but we'd always know we settled.

VERDICT

BITDEFENDER INTERNET SECURITY
$50 (3-PC license),
www.bitdefender.com

7

PANDA INTERNET SECURITY 2010

Pandas aren't known for their speed, and neither is this one

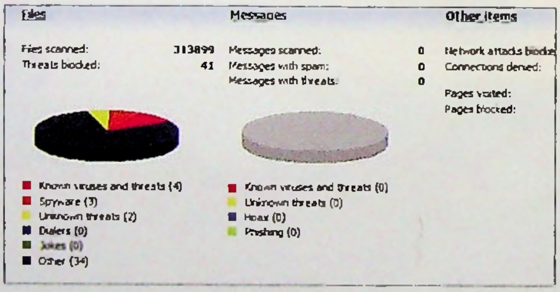
Panda shredded every threat we threw at it with the ferocity of, well, anything but a panda bear. Spyware, Trojans, potentially unwanted programs (PUPs)—you name it, Panda pounced on it like a hungry dog that had been thrown a meaty bone.

This particular Panda can also be a little bit needy. By default, Panda alerts you to every activity under the sun, even benign attempts by your home network to connect to your PC. Over time, the pop-ups settle down considerably, and for the ones of a more serious nature—like those alerting you to a real threat or virus attack—Panda makes it easy to adjust both the transparency and longevity of the pop-ups. Still, we wish Panda would take more initiative and not bother us with so many alerts.

While Panda put up a seemingly impenetrable wall, we can't help but be peeved with its performance. Panda's 13-and-a-half-minute scan time trended toward the back of the pack, and whatever concessions are taking place under the hood to reduce subsequent scans, it isn't enough. Panda only knocked a little more than two minutes off its time during a second run, putting it in second-to-last place, trailing only Avast!'s abysmal half-hour sweep. Panda also added 24 seconds to our boot time, a full seven seconds longer than the average, and another second-to-last place qualifier.

Armchair auditors will love how Panda lays out security statistics, showing you exactly what kind of threats your computing habits tend to attract and even arranging them in a pie chart. We also dig the ability to password-protect certain security features, ensuring a disgruntled coworker doesn't leave your system vulnerable.

If fast scans and optimized boot times are of no consequence, Panda quickly becomes a top-three favorite. Otherwise, look elsewhere.



Files

Files scanned: 313899
Threats blocked: 41

Messages

Messages scanned: 0
Messages with spam: 0
Messages with threats: 0

Other items

Network attacks blocke
Connections denied:
Pages visited:
Pages blocked:

Need proof your roommate's surfing habits are putting your PC at risk? Show him with Panda's pie charts.

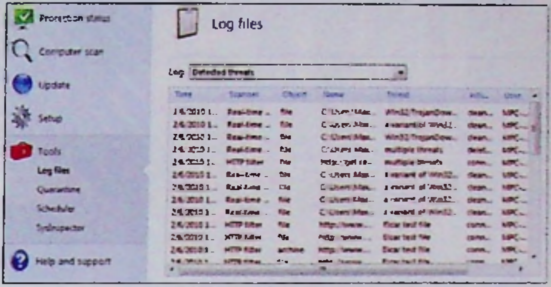
VERDICT

PANDA INTERNET SECURITY
$80 (3-PC license),
www.pandasecurity.com

7

COMODO INTERNET SECURITY PRO

Scans so fast, it should be illegal



Be sure to pay attention during installation or Comodo will install a toolbar, change your default search provider, and redirect your homepage.

There remains a legion of XP users who regard Redmond's nearly decade-old OS as the holy grail of operating systems. And before Windows 7 emerged, we would have agreed, but what XP loyalists seem to forget is just how susceptible to Internet threats their beloved OS was in the early days. Sure, it came with a built-in firewall, but before the second Service Pack, it wasn't turned on by default, and it was never able to monitor outbound traffic.

Enter Comodo, a company that built a following among enthusiasts for its excellent firewall. A lot has changed since then (including much better firewall integration in Windows), and it would be a mistake to peg Comodo as a one-trick pony. Comodo's full-fledged security suite is more of an anti-malware stallion, and if overall scan speed were the Kentucky Derby, this would be the thoroughbred to bet on.

It took Comodo nearly 15 minutes to initially sweep through our test bed, but on the next lap, Comodo turned on the jets and raced through our files in just over a minute. At such a breakneck speed, we wondered if Comodo was cutting corners and would fold once we bombarded it with malicious files. It didn't.

So what's not to like? The interface isn't as slick as some of the others in this roundup, but we're more perturbed at Comodo's attempt to upsell us additional security and "features." It started during installation, when Comodo tried to sneak in a third-party toolbar, change our homepage, and make Ask.com our default search provider—lame. Then there's the persistent link in the UI to purchase LivePCSupport, which offers to scrub your registry and "optimize" your PC. Not cool when you've already paid for protection. ⏻

🟩🟩🟩 VERDICT	
COMODO INTERNET SECURITY PRO $50 (3-PC license), www.comodo.com	6

The Final Word

What became all too obvious during our comparative evaluation of AV suites is that a strict appraisal of feature lists, and even performance numbers, tells just part of the story. Only by using these apps in a real-world way were we able to conclude, for example, that ESET Smart Security remains a favorite, that the free Microsoft Security Essentials is a great solution for cheapskates, that McAfee has redeemed itself, and that Trend Micro Internet Security Pro just plain sucks.

PERFORMANCE

	SCAN 1 (MIN:SEC)	SCAN 2 (MIN:SEC)	PCMARK	BOOT (SECONDS ADDED)
NORTON	16:18	4:47	5,760	+18
ESET	7:45	7:43	6,067	+12
AVIRA	6:37	3:12	6,093	+6
MSE	16:56	16:56	5,622	+9
MCAFEE	13:33	6:45	5,645	+13
TREND MICRO	13:00	8:55	5,475	+32
BITDEFENDER	11:47	2:58	5,801	+18
PANDA	12:28	11:16	5,738	+24
COMODO	14:56	1:11	5,486	+15

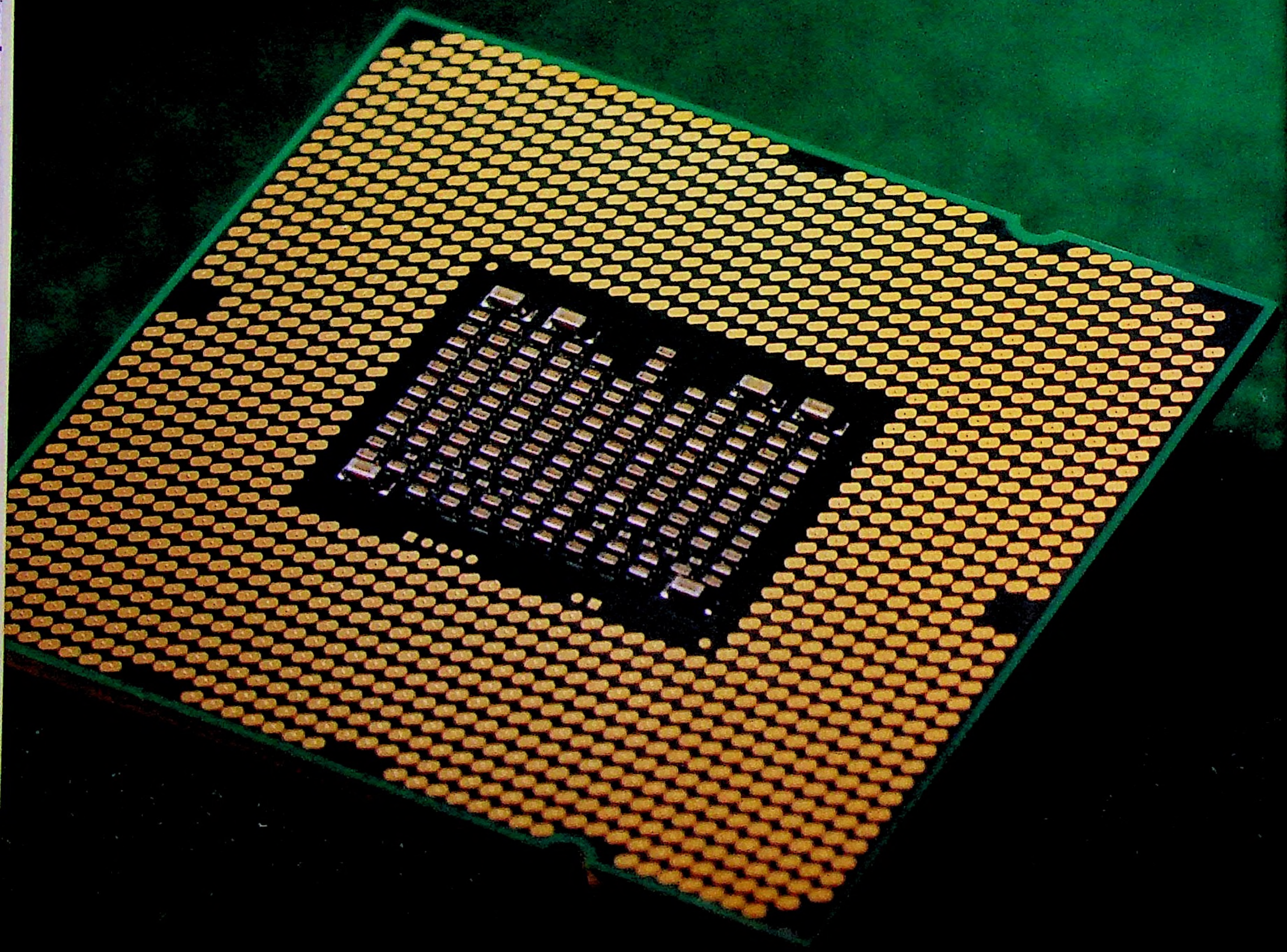
FEATURES

	EMAIL SCANNING	IM SCANNING	SPYWARE PROTECTION	ROOTKIT PROTECTION	HEURISTICS	FIREWALL	IDENTITY PROTECTION	SPAM CONTROLS	PARENTAL CONTROLS
NORTON	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ESET	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No
AVIRA	No	No	Yes	Yes	Yes	No	No	No	No
MSE	No	No	Yes	Yes	Yes	No	No	No	No
AVAST!	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
MCAFEE	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No
TREND MICRO	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
BITDEFENDER	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
PANDA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
COMODO	No	No	Yes	Yes	Yes	Yes	No	No	No

INTEL Rolls a Six

The venerable chipmaker gambles on multithread madness with its hexa-core Core i7-980X

BY GORDON MAH UNG



Meet the world's fastest CPU. OK, so we just gave away the big reveal to our report before you even flipped one page, and without so much as the common courtesy of a spoiler alert. For that, we do not apologize, because it's not like you couldn't have guessed how this one would end up. After all, Intel's new 3.33GHz Core i7-980X (code-name: Gulftown) builds on all the goodness of the ass-kicking quad-core 3.33GHz Core i7-975 Extreme Edition, but is smaller, cooler, and has an additional two cores under its heat spreader. With Hyper-Threading enabled, that's a cool 12 threads at the ready. How could it be anything less than badass?

In fact, Intel's Core i7-980X seems to be one of the most flawless launches we've seen from the company in some time. By flawless, we mean there have been no contortionist acts, such as explaining to consumers that a new socket (LGA1156) will have the same CPU branding as an incompatible existing socket. Nor is there the head-scratcher of a very novel, yet very limp, integrated graphics chip in a CPU (Clarkdale), which, by the way, won't work in boards that lack graphics output ports.

With Core i7-980X, you update your BIOS, drop the chip in, and—voilà—you spend hours rocking a six-core high. Put simply, Core i7-980X is 24-ounces of prime-rib red meat for performance enthusiasts who really haven't had much to gnaw on since the original 3.2GHz Core i7-965 Extreme Edition came out two years ago.

So we're done, right? You don't need to read on? Sorry, there's still more to learn. If you want to know if your motherboard works with the new chip, what applications can really exploit the six cores, and how this bad boy performs, you'll have to turn the page.

INTEL'S TOP PROCS COMPARED

	CORE I7-980X	CORE I7-975 EXTREME EDITION	CORE I7-870
Code-name	Gulftown	Bloomfield	Lynnfield
Clock Speed (on Turbo)	3.33GHz (3.6GHz)	3.33GHz (3.6GHz)	2.93GHz (3.6GHz)
Cores/Threads	6/12	4/8	4/8
L2 Cache	1MB	1MB	1MB
L3 Cache	12MB	8MB	8MB
RAM Support	Tri-channel DDR3/1066	Tri-channel DDR3/1066	Dual-channel DDR3/1333
TDP	130 watts	130 watts	95 watts
Process	32nm	45nm	45nm
Transistor Count	1.17 billion	731 million	774 million
Die Size	248mm^2	263mm^2	296mm^2
Socket	LGA1366	LGA1366	LGA1156
Price	$999	$999	$562

WHAT'S IN A NAME?

We know that, by now, enthusiasts should be immune to Intel's confusing model numbers, but there's one thing that sticks in our craw about the Core i7-980X: Despite it being the world's first consumer x86 hexa-core, and despite it using the latest 32nm process, it's label is a mere five notches greater than the quad-core Core i7-975 Extreme Edition part it ostensibly replaces.

Surely, all the goodness of two more cores and a total 12 threads of computing warrant a Core i9 designation, or at the very least, a much higher model number, right? No, Intel officials told us. The company said that, despite previous reports that it would call its hexa-core Core i9, Intel backed off when retailers and vendors complained of too many blasted brands. And as to why it isn't a 999X or 9900X, Intel said such gestures are unnecessary. The part is designed for enthusiasts and the folks who buy it will know that it's not a mere five clicks better than a Core i7-975.

BENEATH THE SURFACE

Fortunately, the chip is fairly simple to understand. It uses the new 32nm process that was introduced with the dual-core Core i5/Core i3 Clarkdale CPUs. For code-name junkies, that makes Gulftown part of the Westmere family—not part of the original 45nm Nehalem family. All six cores reside o a single contiguous piece of silicon. L the original Nehalem CPUs, each core has 2MB of L3 available to it, giving th CPU a total of 12MB of L3 cache. The cache is shared across all the individu cores, which means a single core can have up to 12MB of L3 cache if the otl five cores are sleeping.

As is the case with all Extreme proc sors, the chip is fully unlocked, allowi you to change multipliers as well as Turl Boost ratios. Turbo Boost is present but n as pedal-to-the-firewall as in the LGA11 parts. The Core i7-980X will give you a Turbo Boost up to 133MHz if more thai one core is active. With single-threade apps, the CPU will Turbo Boost up to

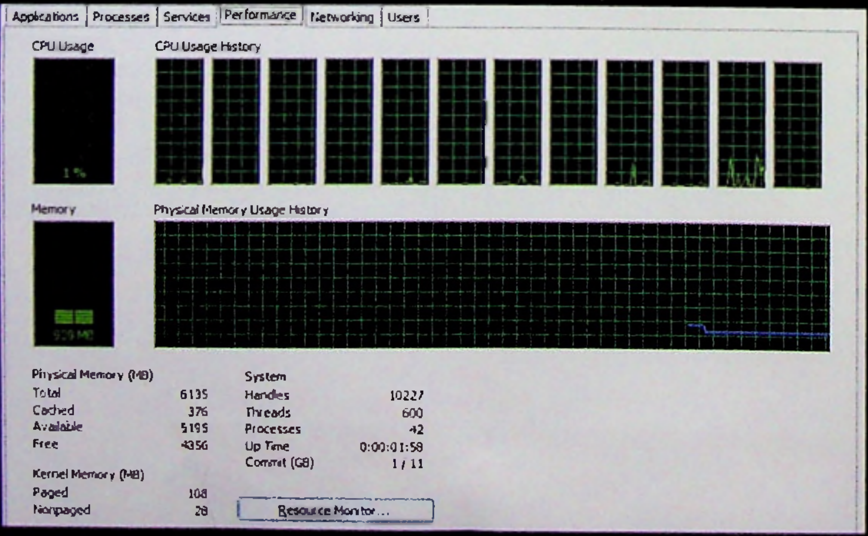
APPLICATION SUPPORT

Even 100 Cores Won't Help Lazy Code

Multiple cores are only useful if there's software that takes advantage of them. Thus, we queried a couple of leading software developers about where they see the multicore sweet spot to be. Their answers shed interesting light on the quest for more threads.

Jeff Stephens, president of Bibble Labs: "Bibble 5 'supports' unlimited cores, and with fast enough disks and efficient OS-level scheduling, we can scale up to about 30 CPUs (performance benefits stop there, so 32 CPUs runs as fast as 30—right now). Without sounding glib, the reason no one else is doing this is because it's hard.... To scale beyond four or so threads, all aspects of a program must be built around parallel processing of huge amounts of data, efficient scheduling of processing tasks, and disk reads/writes to prevent starving CPUs of work to do by waiting for data, et cetera."

Paul Schmidt, president of Photodex: "In my opinion, more cores don't solve the biggest problem. The biggest problem is how the code is written—most code just isn't written to take advantage of more cores. I don't see that changing soon, because writing code for multiple cores is hard and the development world is moving away from hard and toward easy. I think the trend is due to the same old brute-force single-core speed improvements that have been happening combined with how cheap computers are now. Why rewrite for more cores when you can wait a year and get a CPU that is another 20 percent faster?



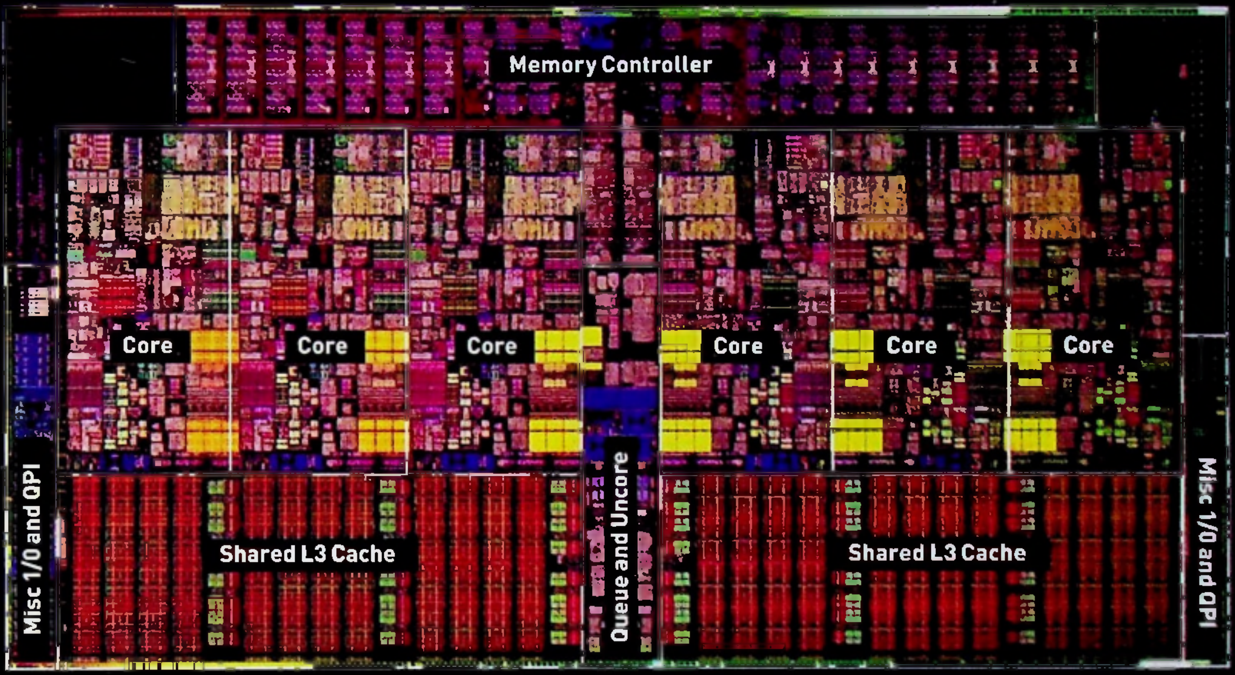
```
Physical Memory (MB)            System
Total              6135         Handles            10227
Cached              376         Threads              600
Available          5195         Processes             42
Free               4356         Up Time       0:00:01:58
                                Commit (GB)         1 / 11
Kernel Memory (MB)
Paged               108
Nonpaged             28
```

With the Core i7-980X, 12 threads can be processed simultaneously, but only if a given app supports them.

UNDER THE HEAT SPREADER

A Close-up Look at the Core i7-980X

All six cores of Intel's Core i7-980X share 12MB of L3 cache on the die. The 1.17 billion-transistor CPU also has two QPI connections but only one is enabled on consumer CPUs. The second QPI is use for multi-CPU Xeon configurations.



266MHz. That's boring compared to the Core i7-870, which will boost from 2.93GHz to 3.6GHz, or about 733MHz. We'd be remiss, though, if we didn't point out that the Core i7-870 starts out at a much lower clock speed.

TICK-TOCK

Keeping with Intel's tick-tock model, with ticks being little jumps and tocks being huge leaps, 980X is a tick. For the most part, besides the process shrink, there's very little that's changed from Nehalem to Westmere. The most notable new feature is the inclusion of advanced encryption instructions, which accelerate encryption.

Overall, Westmere is just a smaller, denser 45nm Nehalem. How much smaller? The Core i7-975 Extreme Edition weighs in at 731 million transistors and occupies 263mm^2 of die space. Core i7-980X has 1.17 billion transistors but occupies just 248mm^2 of die space.

Westmere will run its course until 2011 or 2012, when Intel introduces its Sandy Bridge CPUs. Where Westmere is a tick, Sandy Bridge will be a tock, introducing a new microarchitecture that will include advanced vector extensions as well as other enhancements. For entry-level CPUs, Sandy Bridge will also move the GPU core onto the die. Initial Sandy Bridge chips will be 32nm, with a shrink to 22nm (another tick) due soon after.

PUSHING THE BOUNDARIES

Normally, a smaller process leads to enhanced overclocking, and the same holds true for the Core i7-980X. With the original Core i7-965, we've never exceeded 4GHz on air. The D0-step Core i7-975 improved overclocking, but even there, we've never seen production machines exceed 4.2GHz reliably—and that's with water-cooling. With the Core i7-980X, we went into the BIOS and dialed the base clock up until the processor was at 4GHz. From there, we had no stability issues and performed multiple benchmark runs without incident. Mind you, this was without tweaking core voltage for the CPU, the QPI, RAM, or other various knobs we could have turned to get more reliability. We even got the machine to POST at 4.5GHz on air-cooling, but then it crashed. The verdict is that the Core i7-980X looks to be a wonderful overclocker. (For a review of an overclocked production Core i7-980X see page 74.)

> **BESIDES THE PROCESS SHRINK, THERE'S VERY LITTLE CHANGED FROM NEHALEM TO WESTMERE**

EARLY ADOPTERS GET THE RESPECT

Let's face it: When Intel introduced its LGA1156 Lynnfield CPUs last year, every single person who bought into the Core i7

CPUs and LGA1366 motherboards had a panic attack. Would Intel, as some feared, abandon the LGA1366 platform altogether in favor of the more cost-conscious new socket? It's happened before. Think of Intel's short-lived Socket 423 and AMD's original Socket 940. With those, early adopters got one or two upgrades and then were left waving their DIMMs in the wind.

TO GET A HEXA-CORE TODAY, YOU'LL HAVE TO PAY FOR AN EXTREME SERIES

Fortunately, users who chose the early-adopter route will be rewarded for once. The Core i7-980X is an LGA1366 CPU that should drop into nearly any LGA1366 motherboard. To keep things compatible, Intel even kept the official spec for the Core i7-980X to DDR3/1066 only. Even though the CPU is quite capable of supporting memory at far higher speeds, Intel said it didn't want to require motherboards makers to recertify boards for higher speeds of RAM. For what it's worth, we tested both the Bloomfield and Gulftown LGA1366 Core i7s at DDR3/1333.

You'll still have to update the BIOS before dropping in a Core i7-980X, but we haven't heard of any LGA1366 motherboards not working with the new chip. That's quite an accomplishment for Intel, which has a history of burning people when new CPUs are launched. We don't want to rehash ancient history, but let's just say we're happy it worked out for early adopters for once.

EXTREME EXCLUSIVITY

Intel has long had a dilemma with its Extreme series of CPUs. Only folks with deep pockets actually purchased the Core i7-975—most consumers just bought the poor-boy Core i7-920 and overclocked that puppy up to the 3.7GHz+ range. There was simply very little incentive to buy the top-end part when the low-end part overclocked so well. That little cheat no longer works, though. To get a hexa-core chip today, you'll have to pay for an Extreme series. That's why we were actually surprised when Intel priced the Core i7-980X at $999. Sure, it's still too rich for most, but as the only game in town, we expected Intel to charge $1,500 for the CPU. At $999, the Core i7-980X is actually the same price as the Core i7-975 part that it will slowly replace.

When will Intel offer a friendlier-priced hexa-core? The company won't talk about unannounced products, but several Internet rumor sites have reported that Intel has a hexa-core Core i7-970 in the $500 range on tap for the end of the year.

IF YOU BUILD IT, WILL THEY COME?

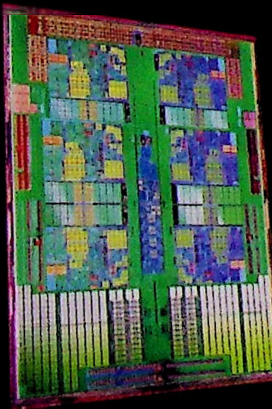
If you think it's all sunshine and lollipops for hexa-core computing, it's not. As always, the problem is finding applications that will actually use the available threads. That was a problem with the original dual-cores and quad-cores; now with a hexa-core and Hyper-Threading, the situation persists. The apps aren't nonexistent, but they're certainly not as prevalent as you would hope. That makes upgrading to the Core i7-980X something you'll want to think about first. Certainly, if you are a mega-multitasker, more cores don't hurt. But if your primary applications are single- or dual-threaded, the extra cores will just sit idle, so you'll need to seriously consider whether paying for a hexa-core makes sense.

THE CHALLENGER

AMD Responds with Phenom II X6

By now, we've pretty much become accustomed to AMD taking a back seat to Intel, particularly in matters of core-count and performance. This year, however, it doesn't look like AMD fans will have to wait as long for a six-core proc.

AMD expects to release its own hexa-core processor, the Phenom II X6, hot on the heels of Core i7-980X this spring. The chip will be a derivative of the company's Istanbul CPU that's been available for some time in Opteron-based servers. The chip is likely to have 6MB of L3 and will be compatible with AM3 sockets. It's not clear if the new chip will work in AM2+ boards, as we've been told that DDR3 will be mandatory for the new chip.



One other trick AMD may have up its sleeve—if a news report from Xbit Labs is correct—is its own spin on Turbo Boost. Using so-called Dynamic Speed Boost, Phenom II X6 processors may overclock individual cores when the full complement of cores is not in use.

AMD is also continuing to forge ahead with its Bulldozer core, which the company hopes will put it back on a competitive edge with Intel. Bulldozer's new microarchitecture will support advanced vector extensions and will be built on a 32nm process. Bulldozer is expected to be available in early 2011.

Let the Benchmarks Begin!

Intel's new hexa-core a favorite in all multithreaded events

For our showdown, we decided that the new hexa-core has two primary competitors: the Core i7-975 Extreme Edition and the LGA1156-bound Core i7-870. We considered adding AMD's Phenom II X4 965 to the mix, but the pricing ($185) and performance of that CPU put it in a different class than the three Intel chips. When AMD's Phenom II X6 hexa-core hits in the near future, we'll certainly test it against the competition.

For our tests, we used both older and newer benchmarks to stretch the Core i7-980X. We turned to both synthetic and real-world applications for video editing, encoding, 3D rendering, and memory tests, along with a handful of gaming benchmarks. Be advised, when we review a CPU, we set resolutions fairly low in order to remove the GPU from the equation.

The verdict: We have no problem proclaiming the Core i7-980X as the world's fastest. Obviously, it shined the brightest in our multithreaded 3D-rendering benchmarks, where its performance surmounted the already ludicrously fast Core i7-975 by 37 percent to 55 percent. Encoding was also given a healthy 25 percent performance boost. Likewise, video editing saw the hexa-core achieve anywhere from 10 percent to 25 percent performance boosts. In applications where multithreading is minimal, the Core i7-980X was usually tied with the similarly clocked Core i7-975. We do suspect that the larger L3 cache of the Core i7-980X paid off dividends in several of our gaming benchmarks.

One figure we couldn't quite square was the memory performance of the Core i7-980X. We expected its memory bandwidth in the synthetic tests to be equal to the Core i7-975's, but the hexa-core was at a disadvantage. The lower memory bandwidth didn't seem to hurt in the other benchmarks, though.

In the final analysis, this is a CPU that turns in performance that is, at its worst, equivalent to the Core i7-975 it replaces. At its best, the i7-980X offers up to 50 percent more performance than its closest competitor. That's pretty much unprecedented and certainly helps the Core i7-980X earn its crown as the new performance king. ⏻

BENCHMARKS

	3.33GHZ CORE I7-980X	3.33GHZ CORE I7-975 EXTREME EDITION	2.93GHZ CORE I7-870
Premiere Pro CS3 (sec)	**453**	504	539
Sony Vegas Pro 9.0c (sec)	**2,675**	3,244	3,531
Cinebench 10 64-bit	**27,479**	20,147	19,197
Cinebench 11.5 64-bit	**8.92**	5.99	5.54
POV Ray 3.7	**6,556.5**	4,235.9	4,493.7
HandBrake 0.9.4, DVD to iPhone (sec)	**941**	1,170	1,247
Main Concept 1.6 (sec)	**1,827**	2,008	2,486
Photoshop CS3 (sec)	89	91	100
Adobe Lightroom 2.6 (sec)	419	418	422
ProShow Producer 4 (sec)	**1,092**	1,208	1,293
Bibble 5.02 (sec)	**97.2**	120	122
PCMark Vantage 64-bit Overall	**10,470**	9,260	9,120
Everest Ultimate 5.30.1900 Mem Copy (MB/s)	13,086	**17,712**	14,693
Everest Ultimate5.30.1900 Mem Latency (ns)	61.3	59.8	**52.5**
Fritz Chess Benchmark (KiloNodes/s)	**12,733**	**12,738**	11,995
Valve Map Compilation (sec)	99	100	106
SiSoft Sandra RAM Bandwidth (GB/s)	19.7	**22.7**	17.1
3DMark Vantage Overall	**15,404**	15,184	14,795
3DMark Vantage GPU	12,307	12,297	12,164
3DMark Vantage CPU	**62,893**	51,321	46,816
Valve Particle test (fps)	**259**	174	159
Resident Evil 5, low res (fps)	134.1	130.7	126.6
World in Conflict, low res (fps)	**358**	317	253
Dirt 2, low res (fps)	155.7	157.0	153.3
Far Cry 2, low res (fps)	158.6	158.2	153.3

Best scores are bolded. We tested both LGA1366 CPUs using an Asus P6X58D Premium motherboard with 6GB of Corsair DDR3/1333, an EVGA GeForce GTX 280, and 64-bit Windows 7 Professional. The LGA1156 CPU was tested with a Gigabyte P55A-UD5 motherboard, 8GB of Corsair DDR3/1333, an EVGA GeForce GTX 280, and 64-bit Windows 7 Professional. Both configurations used a 150GB Western Digital Raptor hard drive.

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How Much Can You Really Fit In a Mid-Tower Case?

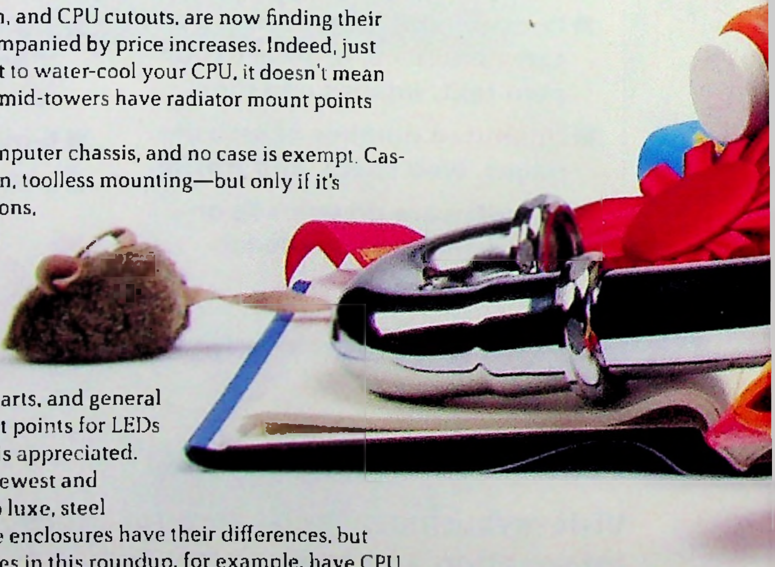
Five mid-size enclosures vie for the honor of housing your coveted gear

BY NATHAN EDWARDS

It seems obvious, right? The more stuff you have, the bigger the box you need to put it in. And in computer-land, you have options ranging from tiny micro-ATX cases the size of a hardback book to enormous full-tower cases into which you could cram every computer part you've ever owned. But not everybody needs or wants a full-tower case. Medium-size cases, or mid-towers, take up less space, weigh less, are more portable, and (hopefully) cost less than their full-tower brethren. What's more, features that were once exclusive to full-tower cases, like dust filters, toolless construction, and CPU cutouts, are now finding their way into mid-size chassis—and not always accompanied by price increases. Indeed, just because you have two 5970 videocards and want to water-cool your CPU, it doesn't mean you have to go with a full-tower anymore; some mid-towers have radiator mount points and room for your beefiest cards.

We have certain criteria for testing any computer chassis, and no case is exempt. Cases gain points for build quality, ease of installation, toolless mounting—but only if it's sturdy!—stock-cooling ability, cable-routing options, and extra features like support for water-cooling installs, space for extra-long videocards, filtered intakes, and SSD brackets. Bonus points are earned for style and going above-and-beyond the expected. Points are deducted for thoughtless design flaws, poor build quality, bad cooling performance, lack of room for essential parts, and general suckitude. We don't automatically add or subtract points for LEDs or other aesthetic flourishes, though tasteful use is appreciated.

This month, *Maximum PC* tests five of the newest and hottest mid-tower cases out there, from budget to luxe, steel to aluminum, tiny to nearly full-tower-size. These enclosures have their differences, but some of the similarities are surprising. All the cases in this roundup, for example, have CPU backplate cutouts in the motherboard tray (a first), and all have very similar front-panel connections. From the small and sub-$100 Zalman Z7 Plus to the big, beautiful, expensive Silverstone Fortress FT02, *Maximum PC* is, shall we say, on the case.



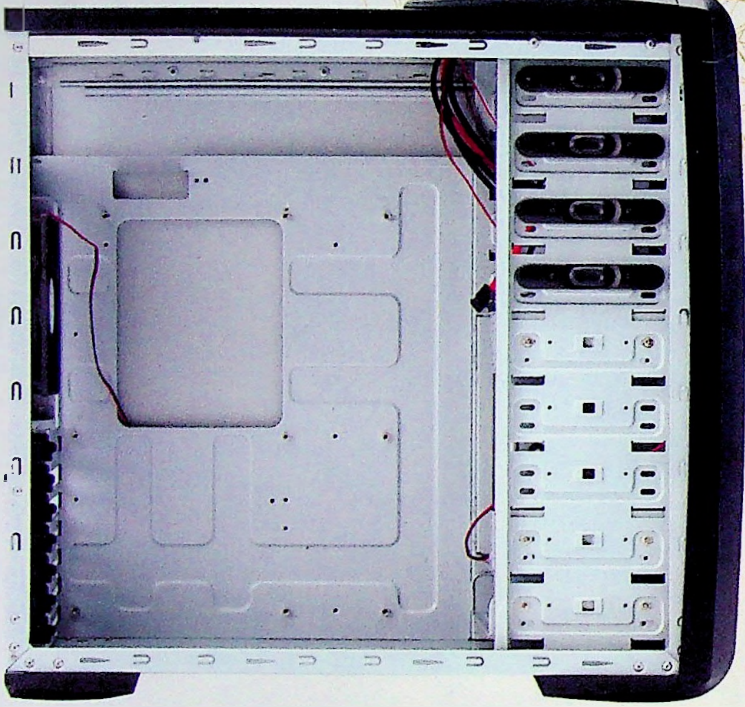
ORGANIC SOUPS
3 BEAN
PLACE

Zalman Z7 Plus

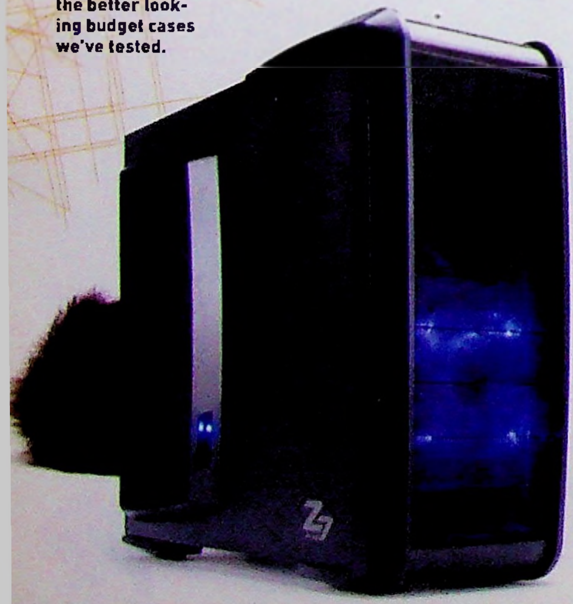
The Z7 Plus's pluses don't quite make up for its minuses

Zalman, a company better known for its CPU coolers than chassis, hasn't released a new case in a while, and its previous ATX-compatible entrants were not without flaws. But now Zalman's back with a miniscule, low-cost mid-tower that sports some surprising features. So, what do 75 smackeroons get you these days? More than you might expect.

The Zalman Z7 Plus is one of the smallest and lightest steel mid-towers in our roundup, at 18.6 inches high by 19.5 inches deep by 8.8 inches wide, and a mere 17 pounds. And though it's not as rock-solid as, say, the Fortress FT02 or as light as the Lian Li PC-B25F, it's a perfectly acceptable middle ground, especially given the price. For $75, you get four case fans—one 14cm rear exhaust fan, one 12cm LED intake fan attached to the hard drive cage, and two 12cm intake fans for the left side panel, only one of which comes installed by default, but both of which can be controlled via a dial on the side panel. The case also features a cutout in the motherboard tray for CPU coolers that require backplanes, a genius feature that would not have appeared in a budget case a few years ago, but is thankfully becoming standard. Furthermore, the Z7 Plus comes with four toolless optical drive bays and toolless PCI expansion-slot retention clips, as well as a five-drive hard drive bay that you can raise and lower at will.



Given how much room there is behind the motherboard tray, we're baffled that it doesn't have a single cable-routing cutout.



The Zalman Z7 Plus is one of the better looking budget cases we've tested.

The hard drive bay is not toolless—you have to unscrew eight screws to remove it, then use four screws and four rubber grommets to install each drive. But the bay can be moved higher in the case to accommodate extra-long videocards. That's right: You can put two optical drives at the top of the case, install the hard drive bay directly below that, and have room for multiple ATI Radeon 5970s—the longest cards on the market, at more than 12 inches. Why you're putting one or more $700 cards into a $75 case is, of course, your business.

And on that note, there are things you won't be getting with this budget chassis. Like easy-to-remove dust filters. Or cable-routing cutouts in the motherboard tray—a pity, because there's plenty of room behind the motherboard tray. Or vents in the top or bottom of the case, or a place to put a water-cooling radiator. Or a painted interior. And build quality, while acceptable, isn't rock-solid. Still, for $75, it's a lot more case than we were expecting.

This fan-control dial works the two 12cm side-panel fans included with the Z7 Plus.

VERDICT	
ZALMAN Z7 PLUS $75, www.zalman.com	**7**

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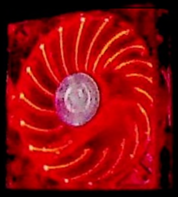

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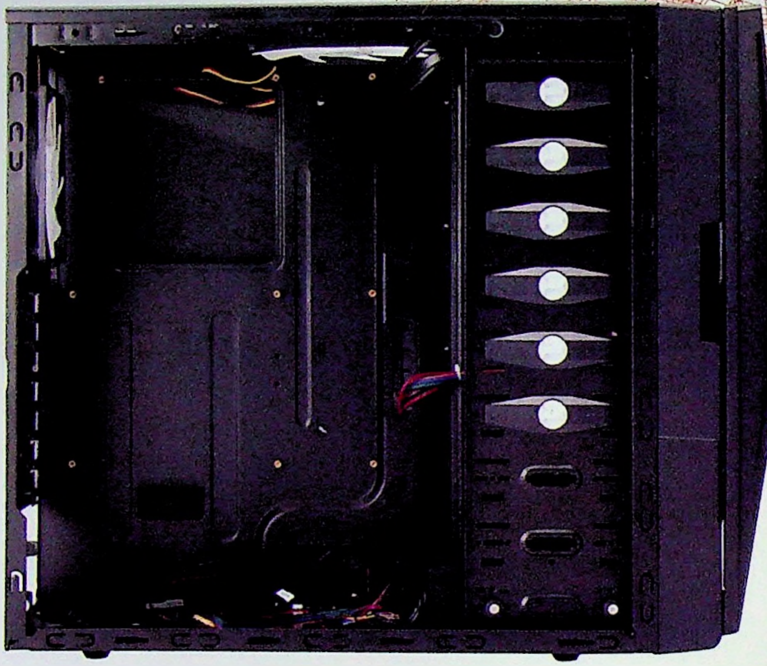
NZXT Hades

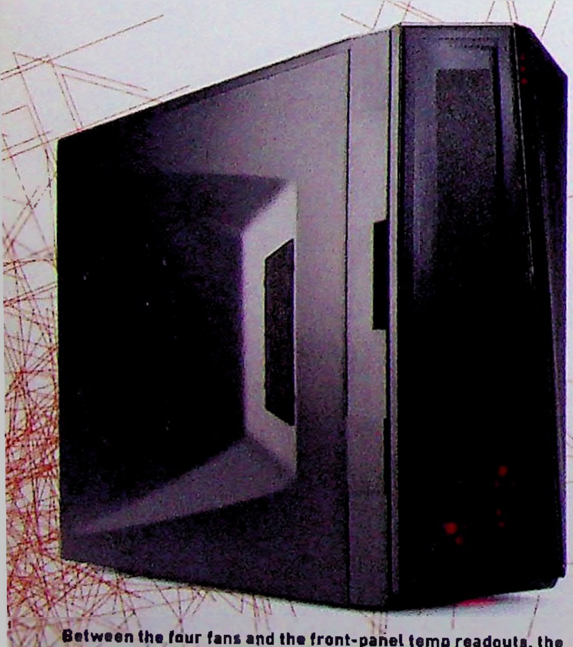
A surprising amount of bang for your Benjamin

Sartre said that hell is other people. We don't know about that, but we know what Hades is—a steel mid-tower chassis that's full of surprises, nearly all of them pleasant.

At 7.9 inches wide by 16.9 inches high by 19.7 inches deep, the Hades is skinnier than the Zalman Z7 Plus, though otherwise similar in size. It's all black, inside and out, and the motherboard tray includes a CPU backplate cutout as well as rubber-rimmed cable-routing cutouts. The front and side fans are 20cm monsters, and the top of the chassis has mounting holes for two 14cm or 12cm fans, as well as for a dual-fan radiator, if your tastes swing to water-cooling.

The Hades' nine 5.25-inch drive bays include five toolless optical-drive retention mechanisms, and in lieu of dedicated hard drive cages, the Hades comes with four sets of mounting brackets, so you can install one 3.5-inch hard drive per optical drive bay. The floppy drive bay at the bottom of the case also includes an adapter that can hold two 2.5-inch SSDs (or notebook hard drives, if you prefer). Because of the Hades' flexibility with regards to hard drive installation, it can handle foot-long videocards like the ATI Radeon HD 5970.


A painted interior and accommodations for cable-routing help this case seem roomier inside than it is.


Between the four fans and the front-panel temp readouts, the Hades' internals won't get infernally hot.

The Hades' front door has a magnetic latch and includes a small LCD with three temperature readouts in Celsius or Fahrenheit—one for each of the three thermal probes included with the case (for hard drive, CPU, and motherboard). This is not a standard feature on any case we've tested, much less one that retails for $100. The LCD readout, though, is pretty dim, and hard to see in most normal use scenarios. And while we're huge fans of, well, huge fans, we don't see the need for front-panel doors, even ones as appealingly Vaderesque as the Hades'. That's just personal preference, though.

The three temperature displays on the front-panel LCD connect directly to three interior sensors.

The Hades' biggest downside is its cramped quarters. To route the 8-pin motherboard power cable behind the motherboard tray, we had to move the top 14cm exhaust fan forward to the other top mount; the side-panel fan and sub-eight-inch width of the case limit CPU cooler height to less than six inches; and we would prefer an easier hard drive mounting system.

But the Hades is a lot of case for $100, and it's nice to have options for large videocards, SSD mounting, and water-cooling in the same mid-tower case. And hey, the temperature readout doesn't hurt.

VERDICT	
NZXT HADES $100, www.nzxt.com	**9**

Cooler Master 690 II Advanced

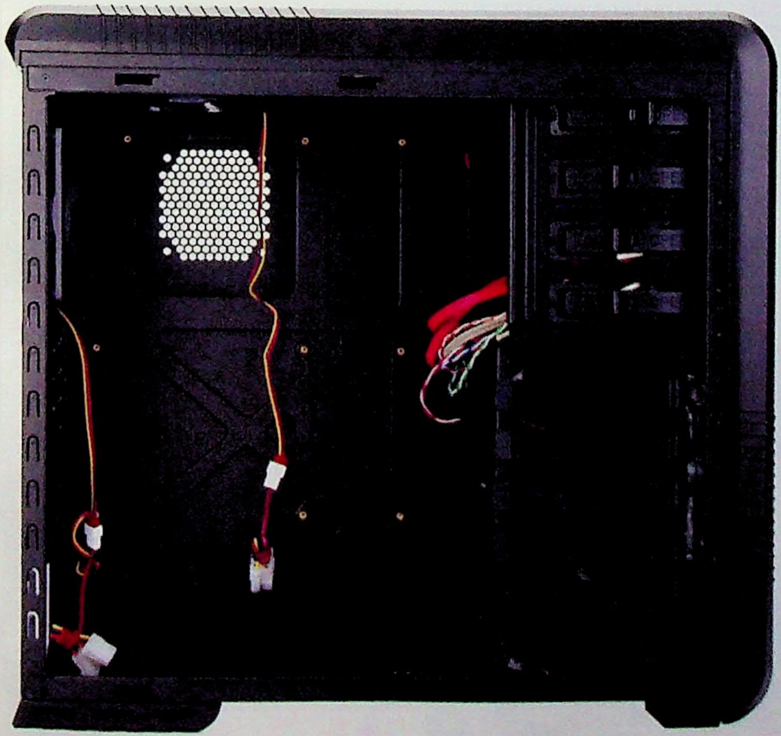
Great style and build quality, but where's the love for long cards?

The Cooler Master 690 II Advanced is the ambitious sequel to the 690, the popular mid-tower chassis of a few years ago. If you've seen a Cooler Master mid-tower lately, much of the 690 II's internals will be familiar to you. The exterior of the case is all black steel and plastic trim, with black mesh running from the bottom of the front panel to the back of the top panel. It's classic Cooler Master, from the 14cm front LED fan (with top-panel LED on/off switch), 14cm top fan, and 12cm rear fan, to the drive bays and filtered intake fans.

Unlike the original CM 690, the 8.4x20.1x20.8-inch sequel has a fully painted interior, with a CPU cutout and cable-routing holes and tie-downs on the motherboard tray. The case has four toolless optical drive clamps, but of a simpler design than CM's previous push-button mechanisms. The 690 II's six hard drive trays are familiar from every CM case of the past two years, though a two-SSD bracket included in the topmost tray is a new feature. And in addition to a top-panel eSATA port, the CM 690 II has a unique and ingenious "X-Data" port—full SATA power and data connectors at the top of the chassis. The port's cover won't fit over even a 2.5-inch drive, though, so it's more for quick data recovery than permanent storage. But it's innovative and we love it.

There's room for a dual radiator between the top of the chassis frame and the plastic top panel, and another at the bottom of the case if you remove the lower four hard drive bays. But one thing there isn't room for is a 12-inch videocard—not without compromises, that is. If you are content running your videocard in a lower PCI-E slot and you remove the lower four hard drive bays, you can fit an ATI Radeon HD 5970, but otherwise you're out of luck.

Good looks, but not enough fans. Compromise turns this great case into a merely good one.



Plenty of room for two dual-fan radiators, if water-cooling's your thing, but not for a 5970.

For folks with standard-size videocards, installation is easy, with plenty of cable-routing options and room for scads of fans. CM touts room for up to seven more fans than it ships with—there's even an 8cm fan mount on the right side panel behind the CPU cooler cutout. We wish the 690 II shipped with more fans, actually. Would a side fan have killed you, guys?

The top "X-Data" port is genius. Who needs eSATA when you have real SATA?

VERDICT

COOLER MASTER 690 II

$100, www.coolermaster.com

8

Lian Li PC-B25F

Floats like a butterfly, stings like a butterfly

Sing it with us: "If you like aluminum chassis / and a whole lot of fans / if you want premium airflow / and have plenty of clams..." then, well, you might find that Lian Li's PC-B25F mid-tower is what you're looking for. At 8.2 inches wide by 19.5 inches high by 19.3 inches wide, it's a mid-size mid-tower, but its aluminum construction makes it the lightest of the bunch. The PC-B25F is completely toolless, if you so choose: The motherboard standoffs are preinstalled (for ATX, anyway) and the mobo screws are all thumbscrews.

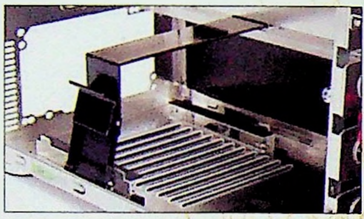
The exterior of the B25F is completely black, except for a circle of blue light at the bottom of the front panel. It's the only light on the case (except the power and drive activity lights) and we like it that way. The B25F's interior is unpainted, but we're willing to forgive that, because shiny unpainted aluminum looks a lot better than unpainted steel. The motherboard tray includes the now-requisite CPU backplate cutout, as well as cable-routing holes, tie downs, and even a few PSU cable-routing clips.

We're disappointed with the lack of 5.25-inch bays and the either/or proposition regarding hard drives and extra-long videocards—you either have a six-drive hard drive cage or you have an extra-long videocard. The hard drive cage's mechanism is a familiar one: Thumbscrews and rubber grommets thread into the hard drives, and slide into rails in the cage. There's even a slider to keep the drives secure once they're in place. The PCI retention mechanism holds expansion cards more firmly than plastic versions. Even the PSU mount has a retention bracket to clamp it to the anti-vibration foam-rubber pads on the standoffs.

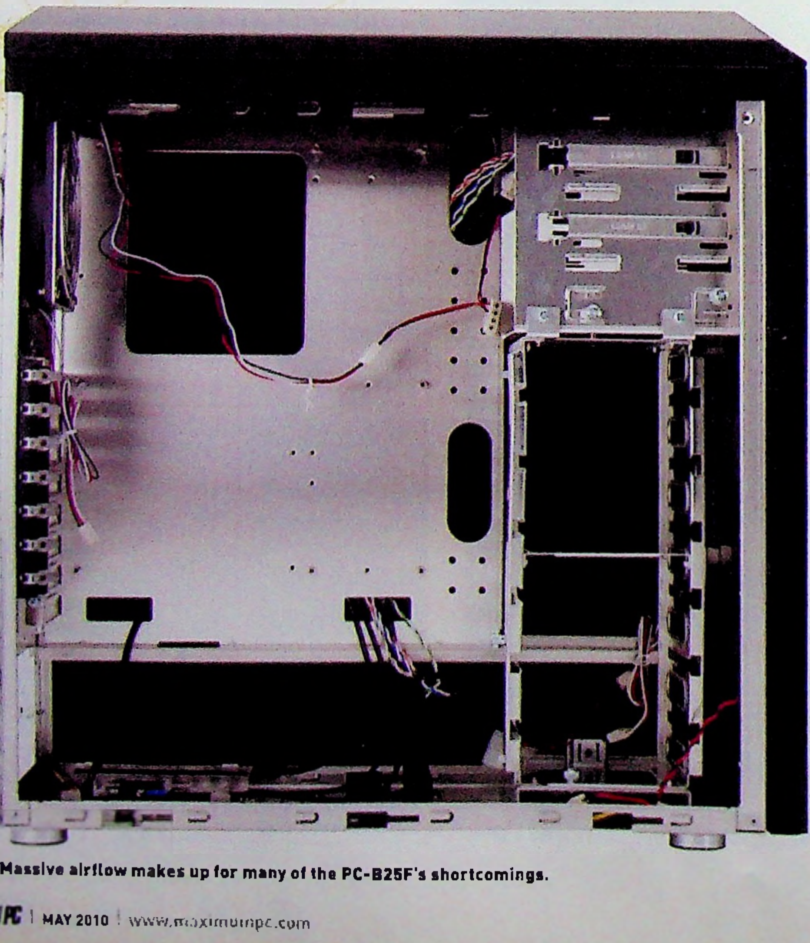
One place Lian Li has never skimped, besides the price of its cases, is in the number of fans that accompany each enclosure. The PC-B25F comes with two 12cm front intake fans, two top 14cm exhaust fans (mounted between the removable top-panel cover and the top panel), and a rear 12cm exhaust fan. The front fans have removable filters, and you can add a filter for the PSU fan, too.

We appreciate Lian Li's rubber grommets on everything that could vibrate, from fans to optical drive mounts to hard drive mounts, and the construction and aesthetics of this case are, of course, top-notch. But $180 for a case with only two optical bays, no radiator mounts, and no support for extra-long videocards is too steep. But then, that's sort of Lian Li's thing.

Like all Lian Li cases, the PC-B25F is all aluminum, beautiful, and full of fans, if not many of the perks we're used to.



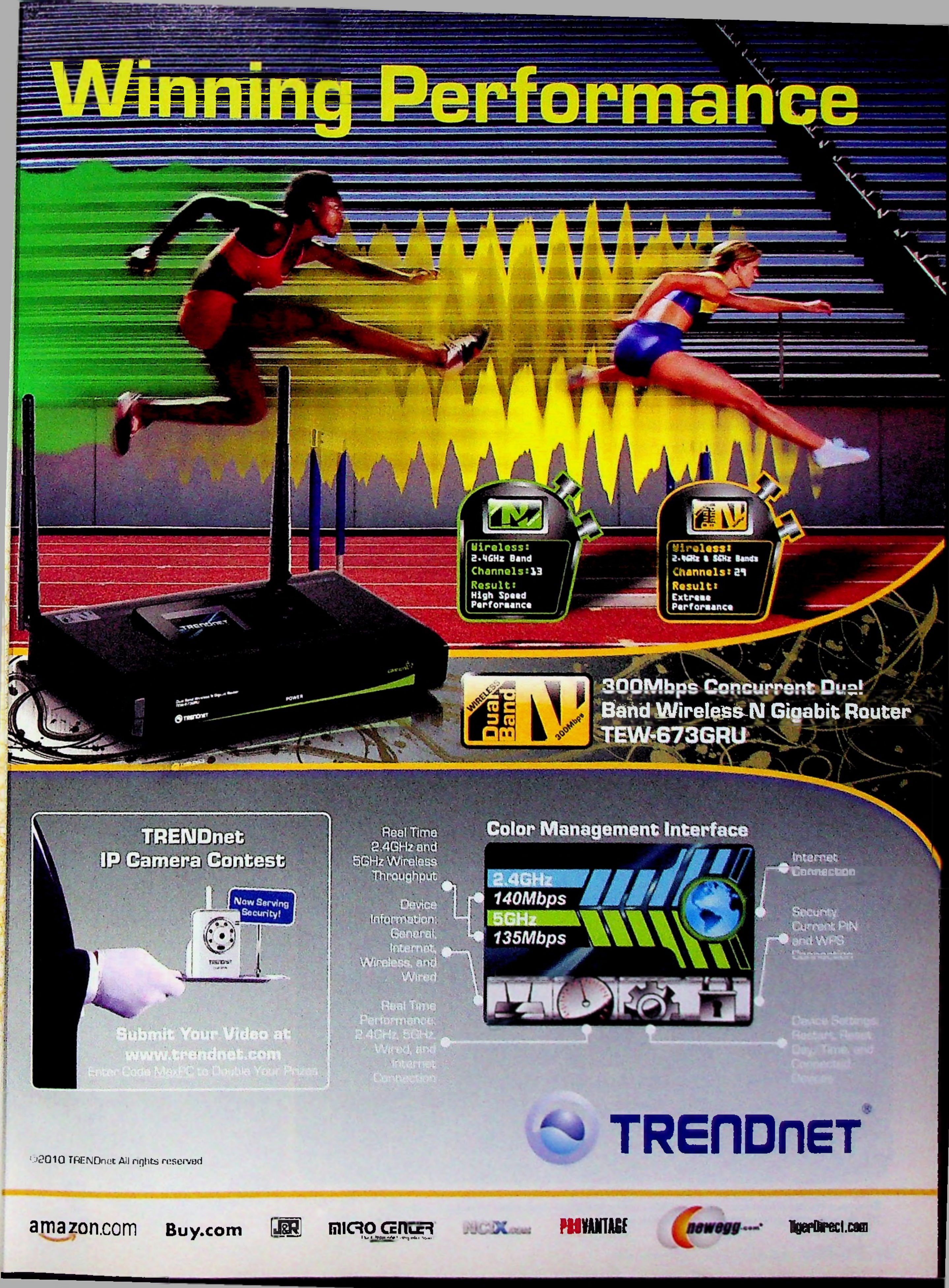
Lian Li's attention to detail shows in the PSU mounting clamp and cable-management clip.



Massive airflow makes up for many of the PC-B25F's shortcomings.

■■■ VERDICT **7**

LIAN LI PC-B25F
$180, www.lian-li.com



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Silverstone Fortress FT02

Built Fortress tough, with a Silverstone price tag

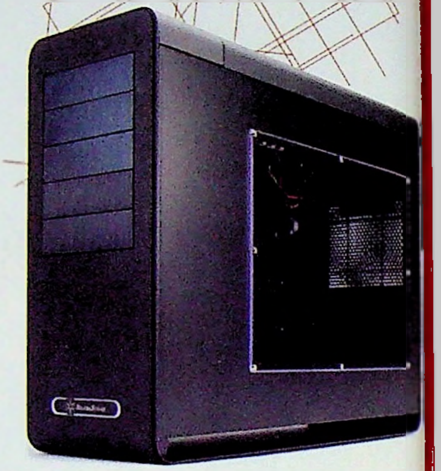
Going on name alone, one would expect the Silverstone Fortress FT02 to be an updated version of our Best of the Best mid-tower case, last year's Fortress FT01. And while it shares a few of the FT01's traits (like a unibody aluminum frame, acoustic padding, and some stylistic cues like black metal mesh), the vast majority of its DNA comes from the Raven RV02. In fact, it's the homo sapiens to the RV02's chimpanzee.

There was some debate in *Maximum PC*'s offices as to whether the FT02 is a mid-tower at all. It's certainly got mid-tower width and height—8.3 inches wide and 19.5 inches high are in line with the rest of the mid-tower market—but its depth, at 24 inches, makes it practically a full-tower on its side. In fact, it's virtually identical inside and out to the RV02, and inherits many of its traits, from the three filtered 18cm fans that blow air from the bottom of the case up to the top, to the rotated motherboard configuration that brings the normal rear panel to the top of the case. The SSD mount that attaches to the left side of the optical bays has carried over from the Raven, as well.

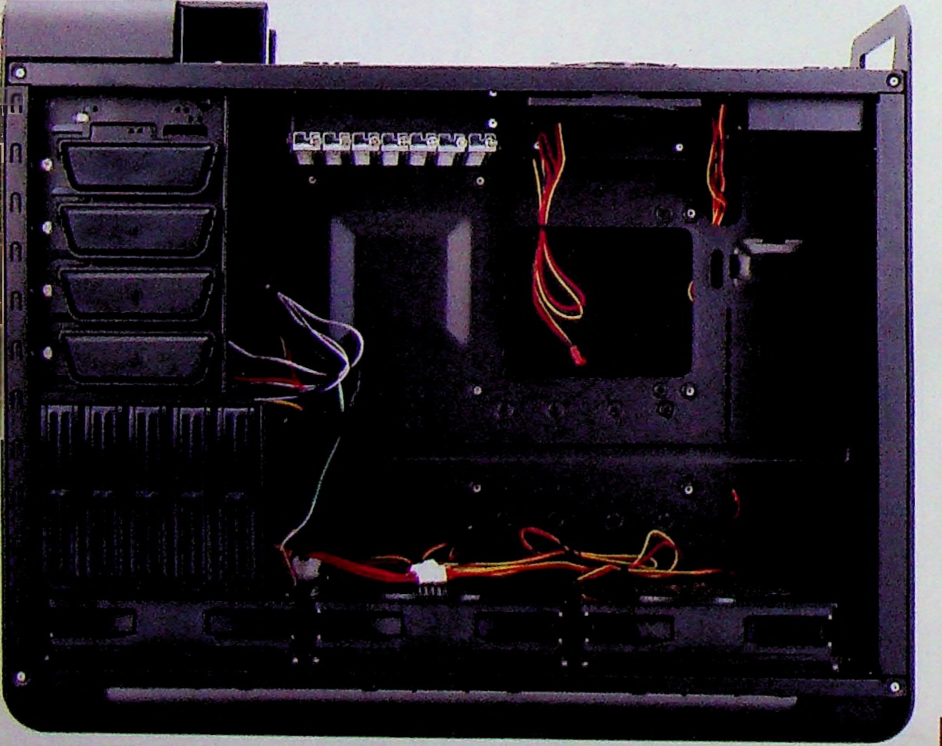
We still like these individual speed switches for the bottom fans.

The few changes the Fortress FT02 brings to the table are positive ones: an aluminum unibody chassis rather than a steel one, and a steel body rather than plastic. Gone is the frustrating hard drive cage in favor of five slide-out trays—it's about time. The FT02 fits 12.2-inch graphics cards, such as the 5970, if you remove the center fan guard, or it can support a dual radiator for water-cooling, but this is an either/or proposition—adding a radiator drops the maximum card length to 10 inches. And while we approve of the rotated motherboard positioning, which makes case wiring much easier in addition to transferring the weight of hefty GPUs from the motherboard to the case, we still don't like the idea of hanging a power supply from the top of the case. It's not going to fall on anything important if all four screws, the retention strap, and the retaining clip fail, but it still makes us a little uneasy.

All told, however, the FT02 is a hell of a case. It's sturdy, extremely attractive, great for cable management, has good airflow, and supports water-cooling radiators or long videocards. But it's $250 and nearly the size of a full-tower. But then, the slightly smaller FT01 isn't much cheaper.



The rotated motherboard placement and right-panel window mean the Fortress FT02, like the Raven RV02, looks strange at first glance.

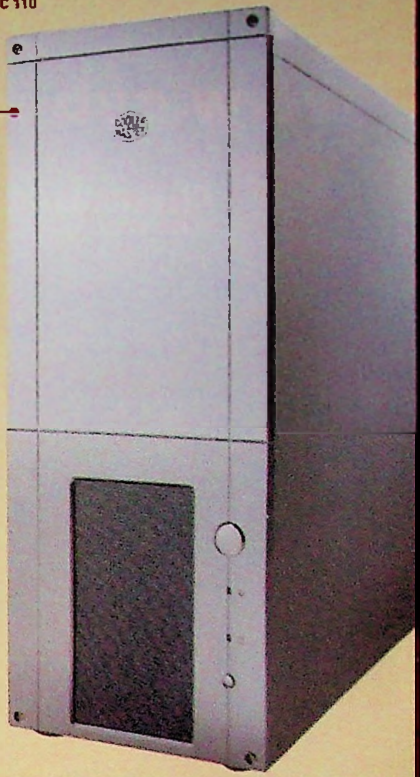


Generous cooling power and intuitive cable-routing make us wonder why nobody thought of this motherboard-orientation thing before Silverstone.

VERDICT **9**

SILVERSTONE FORTRESS FT02

$250, www.silverstonetek.com



Cooler Master ATC 110

Making a Case for Change

From beige to bling, how PC enclosures have evolved through the ages

Since 1995, ATX has been the de facto standard for motherboards, power supplies, and cases. The aging formfactor has informed the past decade-and-a-half of case design, from the bland beige-box era to today's enormous water-cooled, windowed monstrosities. While the formfactor has stayed the same, enthusiast parts and attitudes have propelled cases to new heights of usefulness and blingitude.

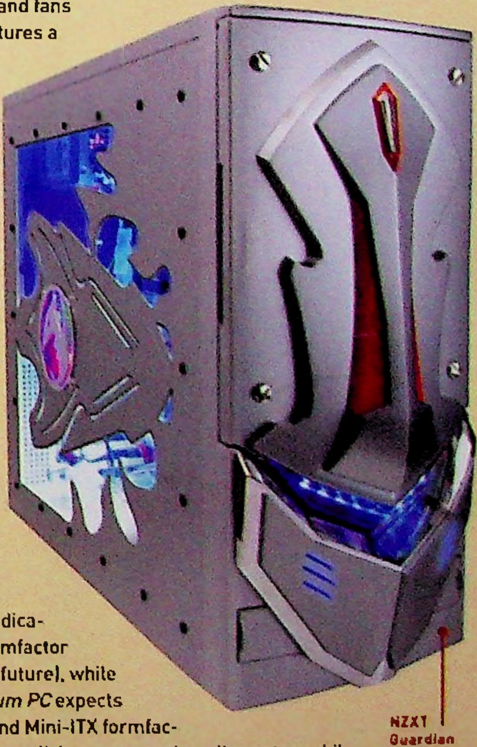
Cooler Master's ATC aluminum chassis series, starting with the ATC 200 in early 2000, was the kiss of death for the beige box. With four 8cm fans, six hard drive bays, and a removable motherboard tray, the ATC series proved that the chassis wasn't just a commodity part to hold your real hardware, but an essential part of your rig—one you could be OK spending $250 on.

Soon, case manufacturers realized that builders could be just as proud of their rigs' exteriors as their interiors, but not everyone wanted to manually cut windows and add LEDs to their stock enclosures, so the race to add acrylic windows, LEDs, and fans was on. NZXT's first case, the 2004-era Guardian, exemplifies this trend. It features a molded plastic and "chrome" case door in the shape of an armored mask, red and blue lights that emit illuminated patterns, a side case fan with flame décor, a chromed dragon emblem, and tricolor LEDs.

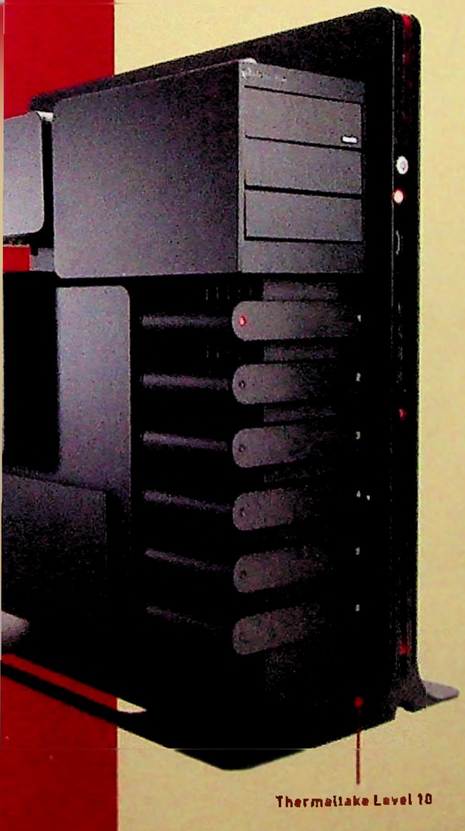
It wasn't all about looks, though—the Guardian's interior featured ahead-of-its-time toolless PCI expansion card holders, optical drive bays, and hard drive bays. Many modern cases eschew the LEDs but keep the toolless interiors.

Both the ATC 201 and the Guardian have their modern descendents—the ATCS 840 and Guardian 921, respectively. Despite a brief flirtation with BTX in the middle of the decade, modern PCs still use the ATX formfactor, so case design, while hardly stagnant, has remained consistent for years. Thermaltake's Level 10 concept chassis (reviewed December 2009) maintains ATX compatibility while mounting all components in separate boxes hanging from a central pillar. It's one of the most innovative cases we've seen recently.

So what's the future of case design? All indications are that ATX will remain the dominant formfactor for the build-your-own set (at least in the near future), while smaller formfactors gain in popularity. *Maximum PC* expects nettops, all-in-one machines, and Micro-ATX and Mini-ITX formfactor HTPCs to increase market share in the kitchen, living room, and media center, while full-size PCs reign in the enthusiast market. Antec representative Veronica Feldmeier says, "Mini-ITX continues to advance as the next big thing." Both Feldmeier and Cooler Master's Bryant Nguyen say that future cases will feature greater airflow and cooling—witness Cooler Master's HAF high-airflow series, including the upcoming HAF X, and Antec's Skeleton and upcoming LanBoy Air cases. Nguyen adds, "As systems continue to grow in power, Cooler Master's chassis must continue to innovate, to include ample cable management, increased expandability, and excellent cooling." ⏻



NZXT Guardian



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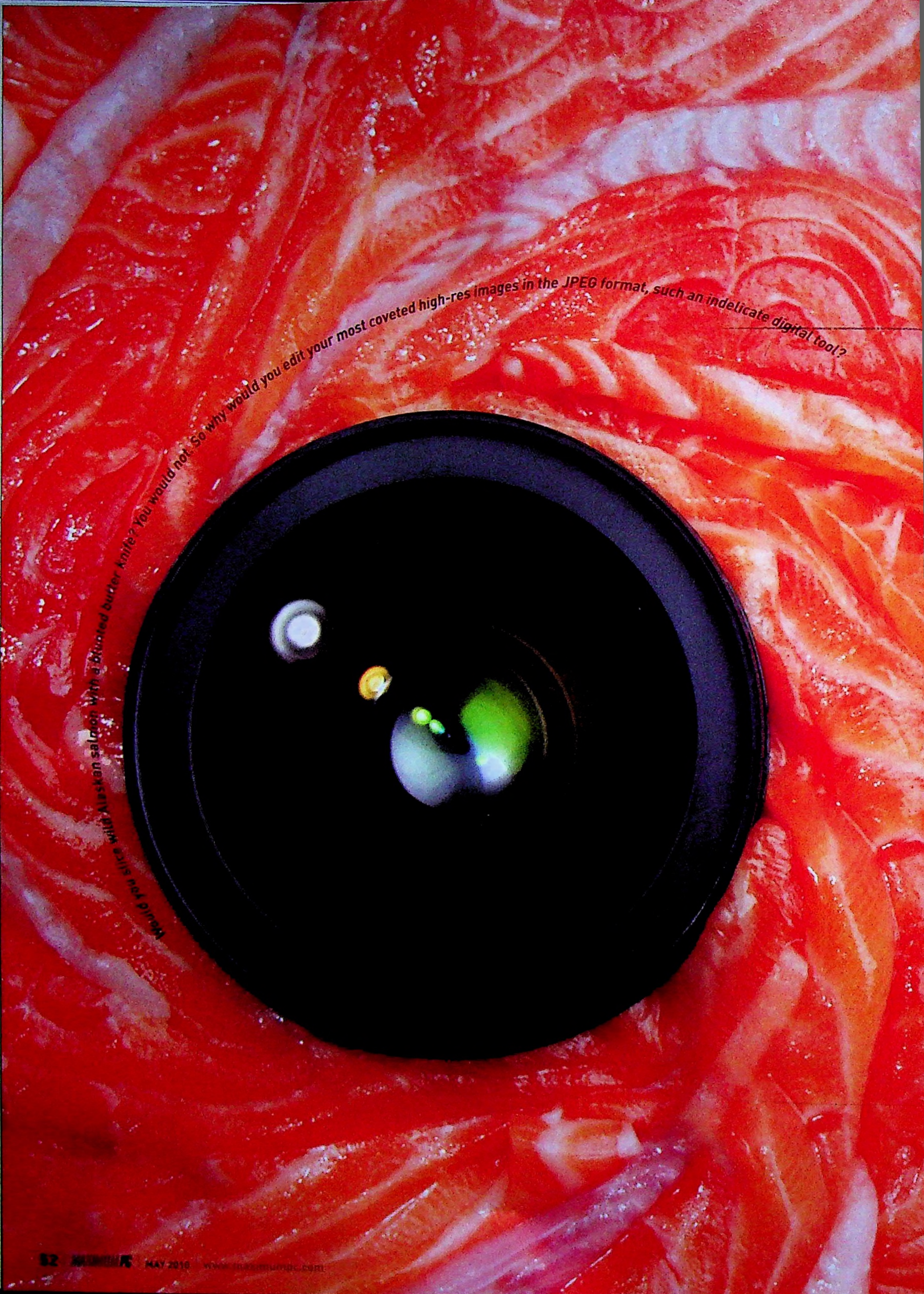


Would you slice wild Alaskan salmon with a blunted butter knife? You would not. So why would you edit your most coveted high-res images in the JPEG format, such an indelicate digital tool?

Some Like It Raw

Forget about JPEGs. You should be working with raw files, editing your photos at their most molecular level. We compare five raw image-conversion and editing apps that promise to take your photography to a higher plane of awesomeness

BY LOYD CASE

It's all about control—and when you set your DSLR to capture images in the JPEG format, you're giving up a whole mess of control. Sure, those images may look pretty good, but your final JPEG output never accurately reflects what your camera sensor actually *sees*, regardless of how well it converts data into the final picture.

A digital camera captures data on an electronic sensor. At its lowest level, this data is known as the raw file. It's sensor data at its purist, virtually free of modifications and any digital conversions. All the sensor does is catch photons on millions of receptors and write the data to files. That data is literally raw—and DSLRs and some high-end point-and-shoot cameras give you access to this data in order to manipulate your photos with tremendous control.

Don't like the ISO setting? Tweak it! White balance doesn't seem right? Correct it! Editing raw files lets you work directly with pure sensor data, making decisions about exposure, shutter speed, fill light, and more, all *after* the image has been actually shot.

But the downside to control is complexity. Raw files often look "wrong" to your eye. You see every bit of noise, color is off, white balance looks weird. The upshot is that you'll need good software tools to get the most out of your raw files. Instead of the camera making the decisions about color, exposure, and other details, you get to do that.

In the following pages, we'll look at five software tools for editing raw images. Two are from Nikon and Canon, who together hold the lion's share of the DSLR camera market. The other three are third-party apps: Bibble 5 Pro, Adobe Photoshop Lightroom, and Adobe Camera Raw. Which is best for your photographic workflow? Which has the most robust features? And what about processing performance? To gauge how well the apps take advantage of modern, multithreaded CPUs, we ran batch-processing tests on a Core i7-975 Extreme system running at 3.3GHz with Hyper-Threading enabled, converting 100 raw files to JPEG—just bare JPEG conversion, with no tweaks or filters applied.

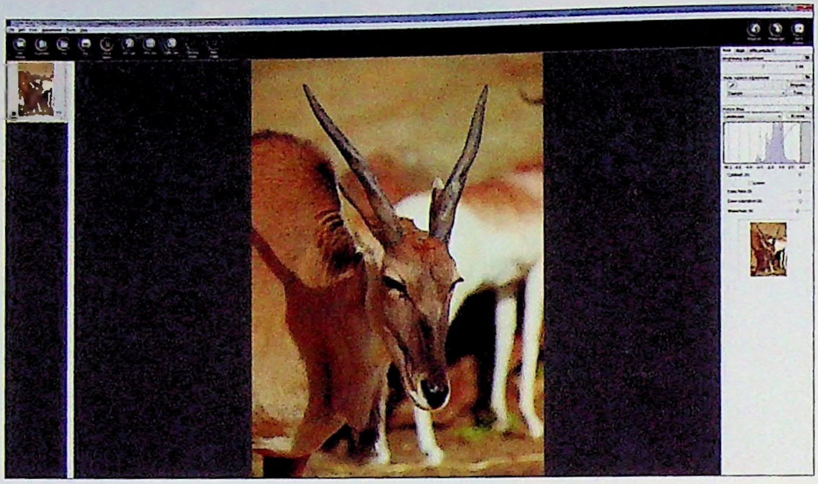
Canon Digital Photo Professional

Canon's Digital Photo Professional (DPP) ships with every Canon DSLR. It's a simple, straightforward editing tool that pretty much supports just the basics: adjusting color temperature, batch conversions to other file formats, and simple noise reduction. It lacks the sophistication of its competitors, but since it comes free with every Canon DSLR, it's tough to be too harsh.

The main interface is simple and uncluttered—arguably *too* uncluttered, as DDP hides much of its functionality under the menus. Want to crop? Pull down the tool menu and launch the trimming tool. Need spot repairs to remove dust specks? Fire up the stamp tool. Once in a tool, you can't do anything else until you finish, then close the tool.

The main photographic touch-up capabilities are available when you begin editing an image. You can easily adjust white balance, brightness, contrast saturation, and tone curves in a tabbed panel alongside the image being edited. It's easy to pop up a window that compares the original to the edited image, so you don't have to always eyeball the changes from memory.

While the noise-reduction capability is limited, Canon at least gives you control over both luminance and chrominance noise, something the more sophisticated Nikon Capture NX2 fails to deliver. In essence, what Canon gives you in DPP are *software* versions of the same tools that you get onboard a Canon DSLR. Canon seems to realize the limitations of DPP by integrating it with Photoshop. A tools menu selection allows for one-click transfer to Photoshop; the image is loaded into Photoshop as a 16-bit-per-pixel TIFF image, bypassing Adobe Camera Raw. Employing this feature means you'll be creating an additional TIFF file, which must be separately loaded back into DPP if you want to continue to edit in the Canon app.



Canon's Digital Photo Professional offers basic editing of Canon RAW files and comes bundled with every Canon DSLR.

Batch-converting Canon raw files to JPEG was a lengthy process: 100 EOS 5D Mark II images (21 megapixels each) took 12 minutes, 14 seconds to convert. Our CPU meter had all threads pegged just a small fraction of the time.

■■■ **VERDICT**

CANON DIGITAL PHOTO PRO
Free with canon DSLR,
www.canon.com

6

■■■ **SAFE KEEPING**

Storage and Backup Strategies for Your Raw Files

Raw files consume vast amounts of hard drive space. In fact, we've accumulated 320GB of raw files in just the last three years. The upshot is that you'll need lots of fast storage if you decide to start living life in the raw.

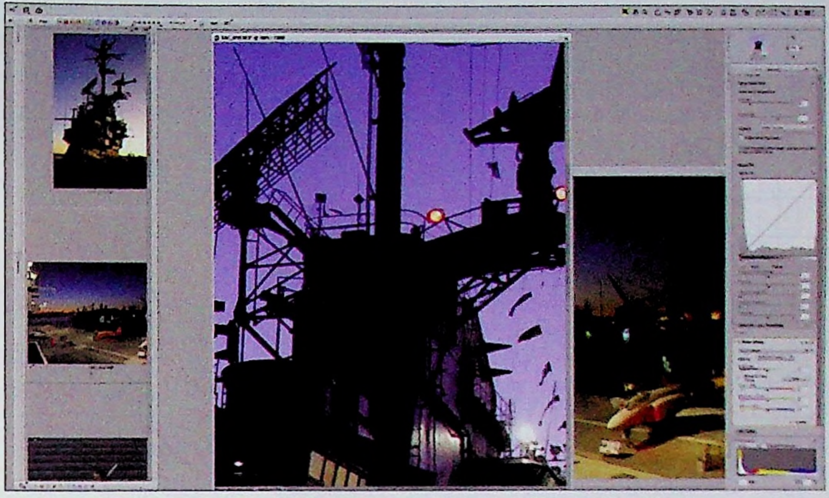
First bit of advice: Don't just dump all your raw images onto a single big drive. That's dangerous, as there are two types of computer users: those who have lost data and those who will lose data. So what you really need is a robust, reliable storage and backup strategy.

If you shoot mostly personal photos, a good external hard drive with a decent backup program can get the job done. Run the backup on a regular basis. If your main hard drive does go down, it's easy to restore from the external drive.

Now, if you're a professional photographer, or just shoot a lot of material for other people, you'll need a better solution. A good start would be an automated backup to an external network storage device that's set up as RAID 1 or RAID 5 redundant drives. In fact, it's a good idea to have your main storage drive be RAID 1, so a single hard drive failure doesn't take you down.

If you're a pro or semi-pro shooter, you also need to think about offsite storage. One natural disaster or fire can destroy both your computer *and* your backup drives if they're in the same location. One approach is to back up your backup to archival-quality optical discs, then store them at another physical location. And if you really need long-term archiving, converting proprietary raw formats, like Canon or Nikon raw files, to open DNG or TIFF files is probably a good idea.

Nikon Capture NX2


The adjustment panels on the main Capture NX2 screen offer highly granular control over the image.

Unlike Canon's bundled-in editor, Capture NX2 is an added-cost option, though Nikon will occasionally include it as a freebie with DSLRs during sales promos. The pricing might be justified for members of the Nikon nation, as Capture NX2 offers considerable sophistication when editing Nikon-sourced raw files.

The original Capture NX had an obtuse user interface, but the latest version cleans up many of the UI issues. How you go about editing images still takes some effort to learn, but once mastered, certain types of edits are much quicker to make than in a traditional app, like Photoshop.

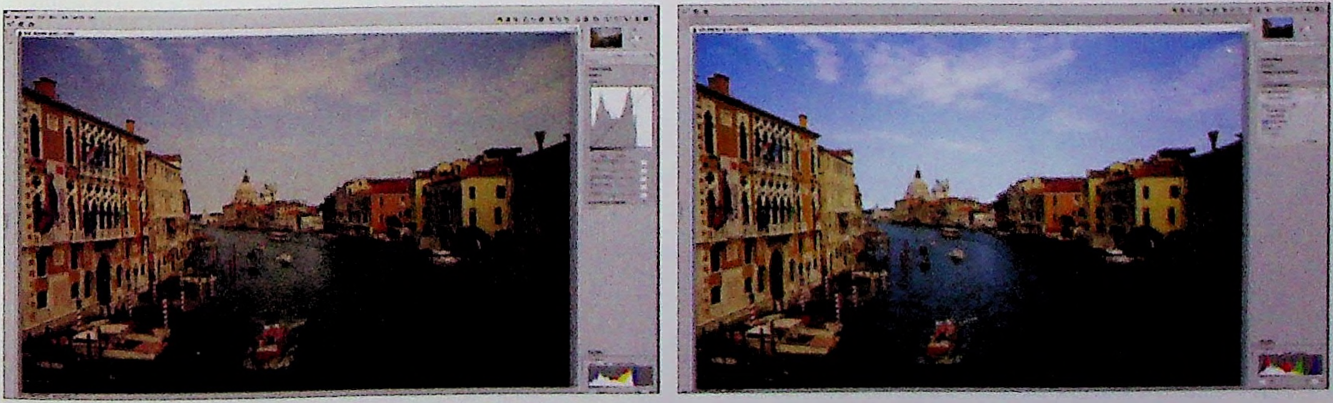
The number of options can be overwhelming, and it's easy to wander into the weeds and get completely lost. However, Capture NX2 is a nondestructive editor, making it easy to revert to earlier versions. Every setting has an undo button, and if you load up a saved file, there's even a way to revert to the original. Capture NX2 saves all the changed data in the main NEF file (Nikon's raw-image file format), so the saved file is larger than the original raw file shot by the camera.

Perhaps one of the coolest features is something Nikon calls control points, a tool for masking off and making changes to specific areas of an image without the tedious selection process required in an app like Photoshop. Want a more saturated blue sky in your landscape? Pop a control point onto the sky area, select everything with sky in it, and move some sliders. It doesn't matter if some of your selection includes non-sky pixels, since the control point itself is in the sky color.

Control points can also be used to easily set layers, letting you quickly remove or change background colors. In addition to color control points, you can set white, neutral, and black control points for maximum control of white balance, highlight, and contrast. Capture NX2 also integrates tightly with newer Nikon cameras, including support for D-Lighting (if that feature is turned on in the camera). D-Lighting underexposes brighter areas to preserve details. Using NX2 allows you to tune the image to brighten up the underexposed parts while maintaining detail.

As with the Canon software, Capture NX2 makes poor use of modern multithreaded CPUs. Converting 100 Nikon NEF files shot with a D300s (12 megapixels each) crawled along at eight minutes, eight seconds. Still, if the app's specific features provide exactly what you're looking for, it might be worth buying if you're already committed to the Nikonian way of life.

NIKON CAPTURE NX2 $120, www.nikonimaging.com	VERDICT **7**


Using control points made it easy to alter the sky saturation (original image at left).

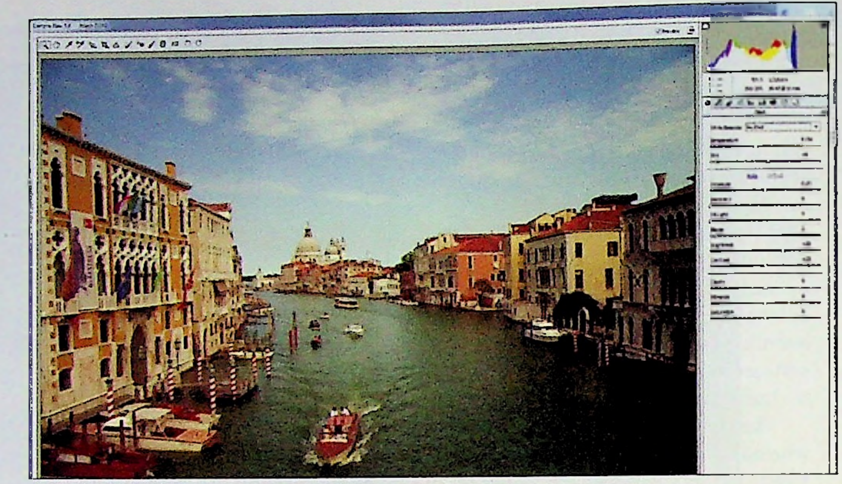
Adobe Camera Raw

Adobe Camera Raw (ACR) isn't a stand-alone app, but rather an add-on built into Adobe Photoshop and Photoshop Elements. Despite its add-on status, ACR offers a rich set of features for tweaking raw files. You can easily adjust exposure, make lens corrections, fix white balance, and do some basic image editing. When you click "done," Camera Raw creates an XMP file (also known as a "sidecar file") that reflects the changes you made nondestructively; the actual raw file hasn't been altered. However, once loaded into Photoshop, any changes made *are* destructive, and you can't save the file as a raw file—not even a DNG-variant raw file.

While ACR offers settings for both luminance and color-noise reduction, their overall impact can be hard to discern. ACR's noise reduction certainly isn't in the same class as Bibble's Noise Ninja. And since ACR is itself an add-on, it doesn't have its own set of aftermarket filters. Indeed, at its heart, ACR is really just a one-dimensional app for modifying the specific properties intrinsic to raw files. It's got some limited image-editing tools—like crop and straighten—but its real strength lies in easily adjusting basic photographic attributes, like exposure and white balance. Its feature set is limited.

The user interface is a bit confusing, and it takes awhile to realize that the icons atop the adjustment panel are actually tabs that take you to other panels. Also, you can't have multiple panels open at once. Performance-wise, ACR is pretty damn speedy: Version 5.6 converted 100 12-megapixel Nikon raw files in just two minutes, 56 seconds. Our CPU meter always ran with all threads, though the bars surged and dropped to zero repeatedly.

The inability to run ACR as a stand-alone app makes it an odd duck. At a minimum, you need to buy a copy of Photoshop Elements in order to even play with ACR. To this extent, if you want ACR's functionality, but don't want a version of Photoshop, you'd do better to invest in Adobe Lightroom.



Adobe Camera Raw is the conduit by which raw images are imported into Adobe's photo editors, but it's also a useful application in its own right.

🟥🟥🟥 **VERDICT**

ADOBE CAMERA RAW
Included in Photoshop/Elements
$600/$99, www.adobe.com

6

🟨🟨🟨 **ARCHIVAL INTEGRITY**

Adobe DNG vs. Raw

DNG, or Digital Negative, is Adobe's attempt at a unified raw format—a format that will be supported into perpetuity, guaranteeing that the images you shoot today can be opened and edited any time in the future. DNG is a freely licensed spec that Adobe has opened up to all software developers and camera manufacturers. The Library of Congress has even suggested that DNG be used as an archive format for digital photos.

The DNG spec is based on a version of the venerable TIFF format, but adds a wrapper that includes extra metadata (that can be tweaked in raw editors) and supports major color-filter technologies. The drawback? Well, the Foveon digital sensor employed by Sigma cameras can only use "linear DNG," a version of the DNG spec that doesn't actually include raw sensor data. Rather, the raw data undergoes a conversion process—and once the data is converted, it can't revert back to raw. Yes, you can continue to adjust all that linear DNG metadata in a raw application, but the data you're adjusting won't be raw, undiluted sensor data.

Nikon, Canon, Sony, and Olympus don't support DNG. However, Casio, Pentax, Leica, Ricoh, Samsung, and Hasselblad do support the pure DNG spec, and if you're using one of their cameras, shooting DNG files is an easy choice. If you're shooting with Nikon, Canon, Sony, et al, you can convert to "pure" DNG using Adobe's own converter.

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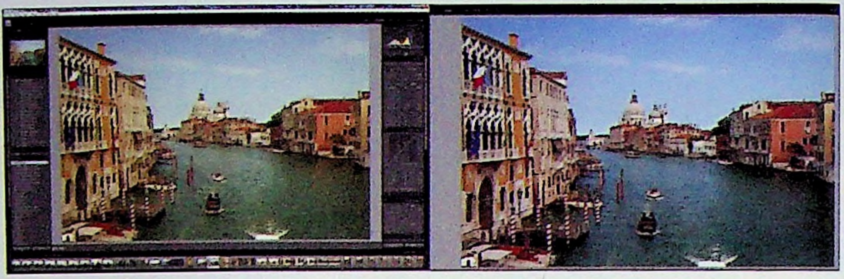
Adobe Lightroom



Lightroom's user interface makes full use of dual displays.

Adobe's stand-alone raw app gives you all the granular photo-hacking horsepower of ACR, plus even more sophisticated photographic adjustments tools and a powerful database tool for managing your collection. And like any good raw app, Lightroom is a nondestructive editor, saving changes to metadata settings, rather than changing the pixels themselves, as Photoshop does.

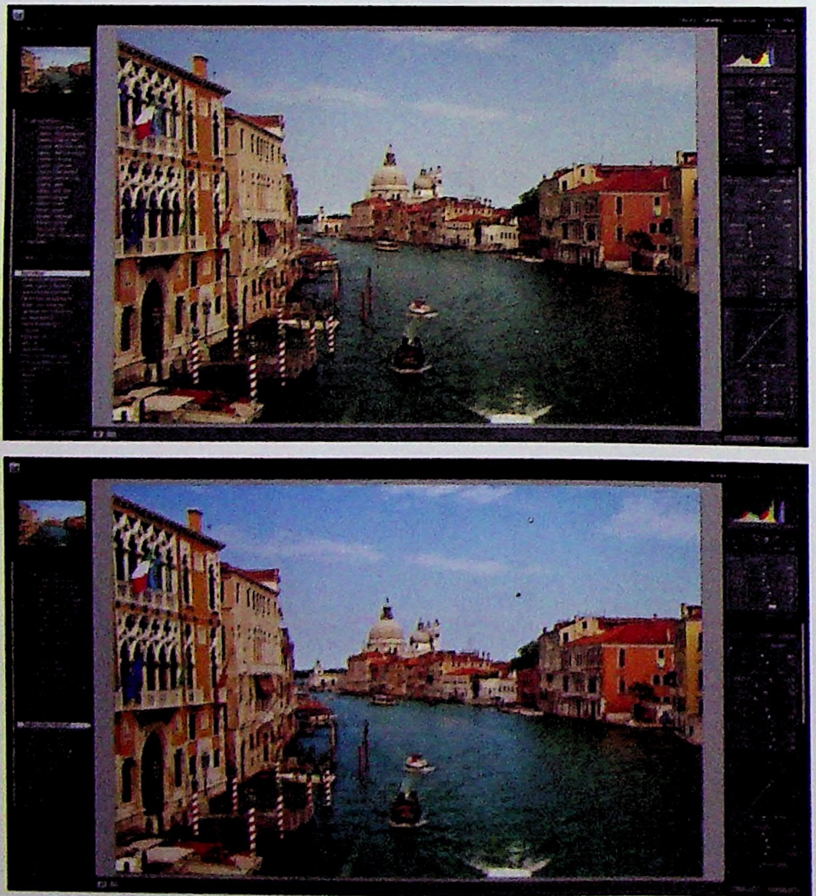
If you're only familiar with image editors like Photoshop, Lightroom takes some adjustment. For one thing, there's no "save" function; if you want to save to another format, like a JPEG or TIFF file, you'll need to use export. The version we tested, 2.6, is fully 64-bit and robustly supports dual displays.

Version 2 of Lightroom is more tightly integrated with Photoshop, but we recommend that you do as much work in Lightroom as possible. All Lightroom edits are nondestructive, but once you load an image into Photoshop, it's loaded as a 16-bit-per-pixel TIFF file. Any edits in Photoshop are baked into the pixels, and when you save and exit, the TIFF file shows up in Lightroom with the Photoshop changes. The original raw file is still present, but doesn't have any of the changes made in Photoshop itself.

Photoshop users may find the selection of Lightroom filters to be limiting. Lightroom's nondestructive nature required many commercial filters to be rewritten, and many filters still aren't available. The app doesn't boast a single standout tool, like Capture NX2's control points, but we dig the ability to create and share presets for automated routines. Need to create more interesting skies, punch up a portrait, or achieve sublime B&W conversion? A large community of Lightroom users is there to help with freely distributed presets. Creating fantastic-looking images is easy once you're familiar with how the tools work, but as with all apps except Bibble 5 Pro, noise reduction in Lightroom is limited.

Because Lightroom is built on top of the Camera Raw engine, we expected performance similar to ACR in our JPEG conversion test. However, Lightroom actually took 11 fewer seconds than ACR 5.6 to convert 100 12-megapixel files, finishing the job in two minutes, 45 seconds.

Besides raw performance, Lightroom has great printing features, giving you robust control over print layout, multipage printing, and color management. Workflow and file-management capabilities are similar to that of Adobe Bridge, but with a UI that's consistent with the rest of Lightroom. In fact, it's possible to use Lightroom as a *replacement* for both Bridge and Camera Raw—but you'll still need Photoshop or Photoshop Elements for a complete solution.



Before and after shots after using Lightroom's graduated filters and tweaking the tone curve (original on top).

VERDICT

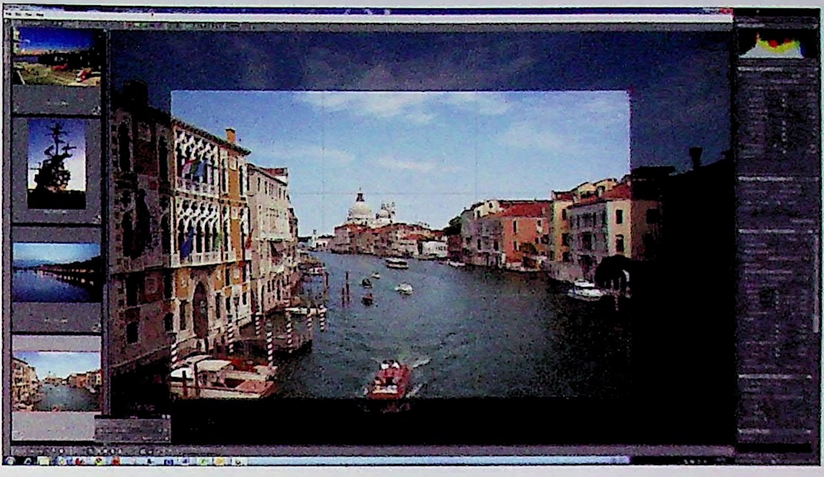
ADOBE LIGHTROOM
$200, www.adobe.com

9

Bibble 5 Pro

Bibble 5 Pro—one of the first applications to marry sophisticated raw editing with robust workflow management—has a loyal following among professional shooters. Earlier versions were criticized for an overly busy and inconsistent user interface, but version 5 has cleaned up most of those issues.

While its pure image-editing tools aren't as extensive as Photoshop's, Bibble 5 Pro does have most of the basic cropping, selection, and layering tools you'd need for digital photo editing—it's a photographer's tool, not a general image editor. On the raw side of life, Bibble 5 gives you meticulous control over exposure, color correction, vignette correction, and a host of other parameters, allowing you to fine-tune a photo's final look. As with Lightroom, Bibble 5 Pro is nondestructive, so if you get lost and don't like what you've done, reverting back to the original is easy.



Bibble 5 offers a complete environment for digital photography workflow.

One of the app's strong suits is noise reduction, since it includes the basic version of the highly regarded Noise Ninja plugin. Bibble 5 Pro also includes several other cool plugins, including Andrea's film-simulation plugin (perfect if you've ever wanted your photo to look like it was shot on Ilford FP4 film and printed on BN Afga MultiContrast paper). That said, Bibble lacks Photoshop integration, so loses out on that rich set of filter possibilities.

Where Bibble 5 Pro really shines is in format conversion, processing our 100 12-megapixel Nikon raw files in a stunning 48.3 *seconds*. To wit: Bibble 5's blazing conversion process was six times faster than anything else! During the conversion process, all eight processor threads were completely pegged 100 percent of the time. Bibble 5 Pro is a shining example of an efficiently threaded application.

It takes a little time to adapt to Bibble's use of layers and selections, particularly if you're used to Photoshop, but once you get the hang of it, it's easy to selectively edit sections of the photo. In the end, Bibble 5 Pro is a full-time tool for full-time photographers, but it's been somewhat eclipsed by Adobe's Lightroom, even though it's arguably more powerful.

VERDICT

BIBBLE 5 PRO
$200, www.bibblelabs.com

9

RAW MEAT Which Flavor is Best?

Canon's Digital Photo Professional is a serviceable tool for basic manipulation of Canon raw files, but it's the most limited app we tested—you really will need something better for robust photo editing. Nikon's Capture NX2 offers a couple of very cool features (particularly control points), but the software's price might be hard to justify for some.

All three of the "non-camera-affiliated" raw apps have strengths and weaknesses. If you're committed to buying just a single tool, Bibble 5 Pro is a compelling choice. Its rich feature set, speedy performance, workflow management, and layering support make for a tidy, complete package, although we do have some concerns about its stability under 64-bit Windows.

Adobe Camera Raw requires the purchase of Photoshop or Photoshop Elements, as it's really an integrated add-on. The current version offers rich raw-file manipulation, but it's not really a useful stand-alone tool. However, if you're already a Photoshop or Photoshop Elements user, Adobe's Lightroom 2 is a must-have. Its workflow management eclipses that of Adobe Bridge (included with Photoshop), it integrates all the features of Adobe Camera Raw, and adds superb management of print output along with other features. Toss in 64-bit and useful multimonitor support, and you've got a great tool. As a stand-alone app, Lightroom 2 is incredibly useful if all you do is crank out large volumes of photos for clients, using presets to automate tasks. But it's best used in conjunction with Photoshop or Elements.

You can get excellent results from all these tools; some will just take a little extra effort. Once you're past the learning curve for a particular app, however, you'll be able to create jaw-dropping photos that people will cherish for years.

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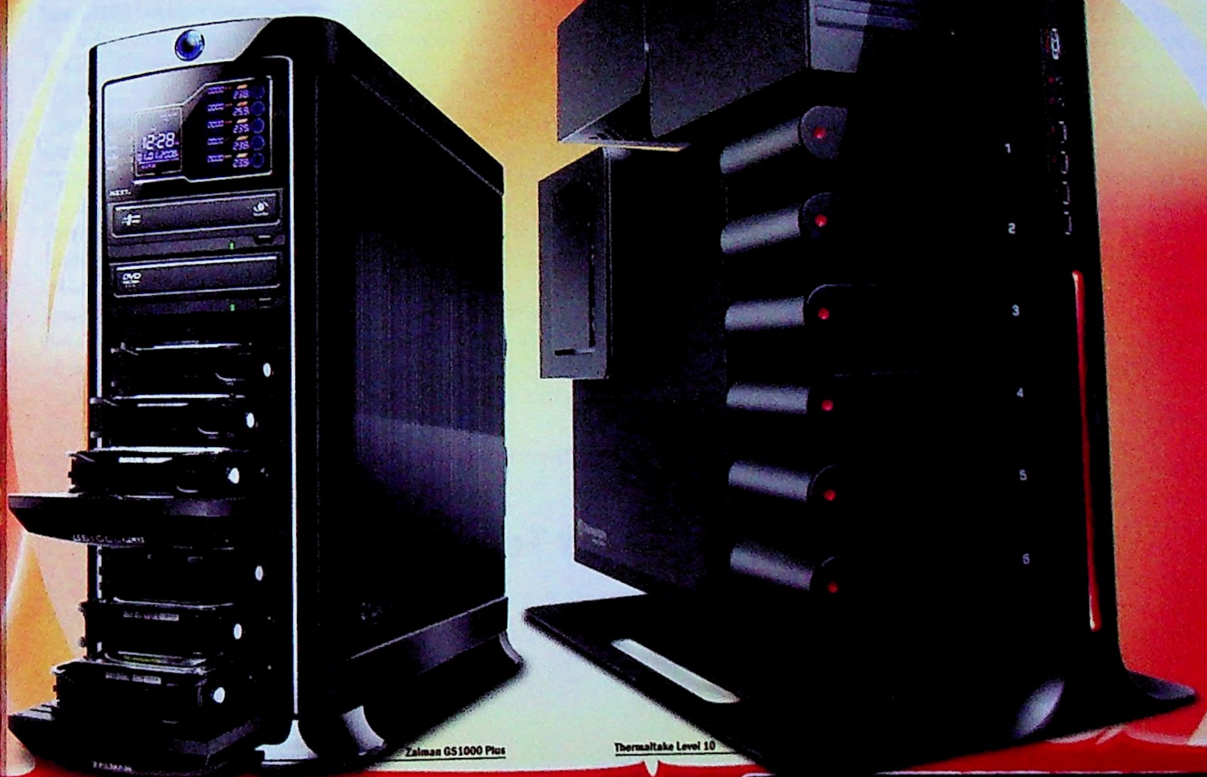

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WHITE PAPER

ARM-Based Processors

More ARM CPUs are sold than all x86 processors combined. They live in your phone, your set-top box, your TV, and more -LOYD CASE

Intel likes to talk up its Atom line of CPUs these days. Mostly found in netbooks, the latest version of Atom is an SoC—system on chip. While Atom runs at speeds up to 1.8GHz, Intel mostly talks about its power efficiency.

Developers who build SoCs around ARM (www.arm.com) processor cores laugh at this—they've been building low-power system on chips for years. And with the latest Cortex A9 cores, ARM processors are arguably more powerful than any Atom, albeit not compatible with x86 code.

An SoC integrates all the functionality you'd expect in a computer: CPU, GPU, memory controller, cache, peripheral interfaces like USB and disk I/O, PCI Express, and more. Some SoCs even include onboard memory. Your cell phone has an SoC, your HDTV has one, and SoCs live in your car. They're unseen, omnipresent, and handle virtually all the computing chores needed for daily digital life.

ARM is one of the largest developers of embedded CPU cores; the company also designs embedded graphics processors and complete SoCs. It does not, however, sell chips. Instead, it licenses the CPU designs to other companies, who are free to modify and add on to the ARM intellectual property to target specific applications.

STRENGTHS AND LIMITATIONS

ARM-based processors deliver complete system functionality in tiny die packages—ranging from 20mm^2 to 60mm^2. Contrast that with the latest Atom N450, which is 66mm^2. Better yet, compare that to the 195mm^2 combined die size for Intel's 32nm Clarkdale plus graphics, and you get an idea of just how small these SoCs can be.

The thermal and power envelopes for these processors are extremely tight. Battery-life requirements for cell phones are stringent, so you typically can't run them at very high frequencies, even if the chip is capable of high clock speeds. However, ARM and its chip design partners have built in aggressive power management. Various parts of the chip can go "dark" when not needed, and clock gating is used wherever necessary. By the same token, individual cores can ramp up to high frequencies when needed, then drop down quickly.

So what you find in an ARM-based SoC is a relatively small, highly integrated part that consumes little power, but delivers the performance when needed. Even the GPUs are designed for small platforms, using tile-based rendering, for example, to minimize memory use and bandwidth costs. The GPU can deliver 30–60fps in a game if it's running at just 320x240 or a similarly low resolution.

When a company implements an ARM core into its chip-level product, it actually gets the IP in the form of a macro cell that can be dropped into the electronic design tools used by the OEM company. The designers can mod the CPU or not, depending on what they want to accomplish.

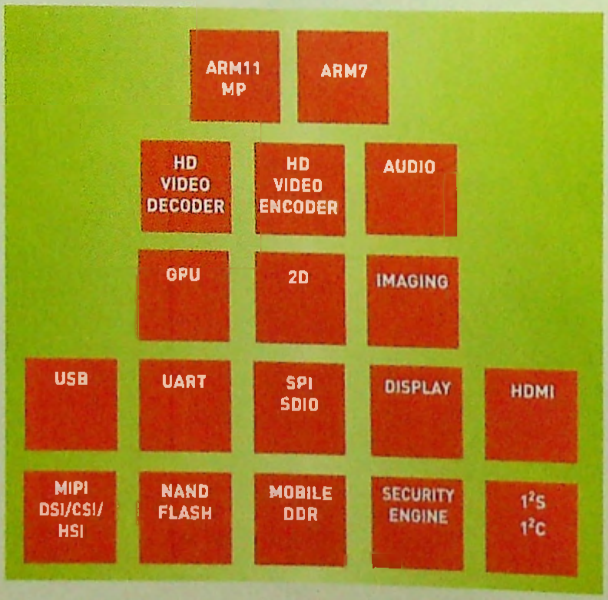
CASE STUDY: TI OMAP

TI's OMAP 3430 is built around an ARM Cortex A8 core, and powers several cell phones, including the highly regarded Palm Pre.

While the OMAP 3430 is an SoC, it still needs a ton of interfaces to the outside world. Unlike some competing products, this generation of OMAP doesn't integrate GPS or Wi-Fi capability into the main die. However, it does build in an Imagination Technologies PowerVR SGX GPU core for integrated 2D/3D graphics. Also integrated is the IVA 2+ multimedia

HOW IT WORKS

Inside Nvidia's Tegra APX 2600



Nvidia's Tegra APX 2600 includes two different ARM cores (ARM11 and ARM7), plus a proprietary GPU, as wells as video and audio processors. A robust set of I/O interconnects are also supported. The ARM11 is single-core, not multicore. The ARM7 is used for low-power audio, but not for rendering audio effects or multichannel audio.

accelerator, which supports resolutions up to 720p, and can encode or decode HD MPEG-4, H.264, and WMV9 at 720x480.

This can easily drive the Palm Pre's 320x480 LCD display. The Cortex A8 core drives the Pre's ability to multitask using Palm's WebOS, something lacking in competing smartphones—especially Apple's iPhone.

One of the coolest things about the OMAP is the hardware encryption/decryption engine, supporting AES, DES, PKA, SHA-1, and other encryption algorithms. This allows for secure communication in a wireless-enabled environment.

CASE STUDY: NVIDIA TEGRA APX 2600

The Tegra APX 2600 is used by Microsoft's Zune HD portable media player. The APX 2600 actually uses two different ARM cores.

The ARM11 core is the general-purpose compute core, while the ARM7 handles additional audio and video chores. The ARM11 runs at 600MHz, with 64KB of L1 cache (32KB instruction, 32KB data.) The CPU also includes 256KB of shared L2 cache.

While the ARM7 handles some audio chores, the APX 2600 also includes separate HD video encode and decode sections on the chip, plus an Nvidia-designed GPU. The CPU has the usual sets of interfaces to flash memory, USB, HDMI, and so on.

All this fits into the tiny Zune HD package, which includes 720p HD video output through HDMI, 3D support for handheld gaming, and web-browsing capability.

ARM EVERYWHERE

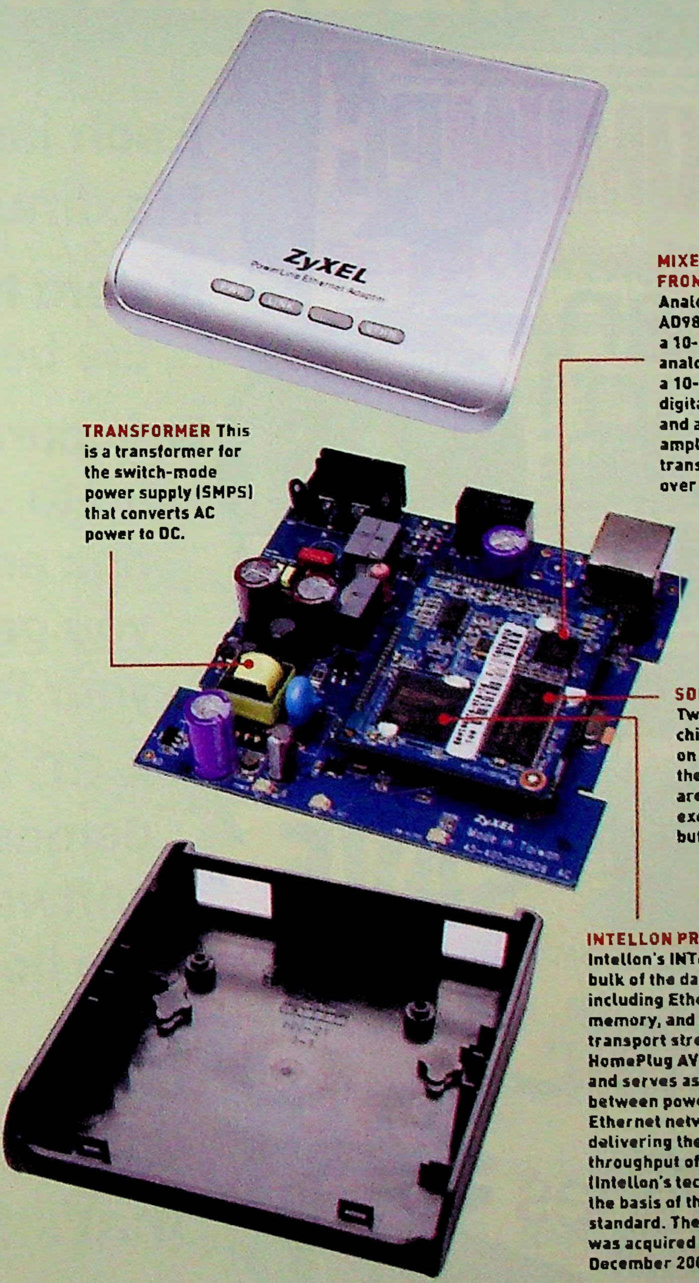
As we've seen from our two case studies, ARM processor cores are used in some of the coolest gadgets available. Other products use ARM technologies, such as Qualcomm's Snapdragon CPU, found in Google's Nexus One Android-based smartphone. Even tinier chips using lower power and less-capable ARM implementations are used for dedicated tasks in automobiles, home electronics, and simpler mobile phones.

Given the prevalence of ARM-based CPUs, as well as the depth of the software development community, we're even starting to see PC-like ARM systems, such as the Apple iPad and the Linux-based smartbooks on display at CES. As Intel tries harder to push into more embedded systems with the x86 Atom, it should be no surprise that ARM will try to push back. Maybe "ARM inside" will be the logo on your next laptop. ⏻

AUTOPSY

Power-line Ethernet Adapter

Power-line Ethernet adapters are the ultimate "no new wires" networking technology, rendering your home's existing electrical wiring capable of carrying Ethernet traffic. We dismantled ZyXel's PLA-400 to find out what's happening behind the scenes.



MIXED-SIGNAL FRONT END This Analog Devices AD9865 integrates a 10-bit digital-to-analog converter, a 10-bit analog-to-digital converter, and a line driver (an amplifier that boosts transmission quality over long cable runs).

TRANSFORMER This is a transformer for the switch-mode power supply (SMPS) that converts AC power to DC.

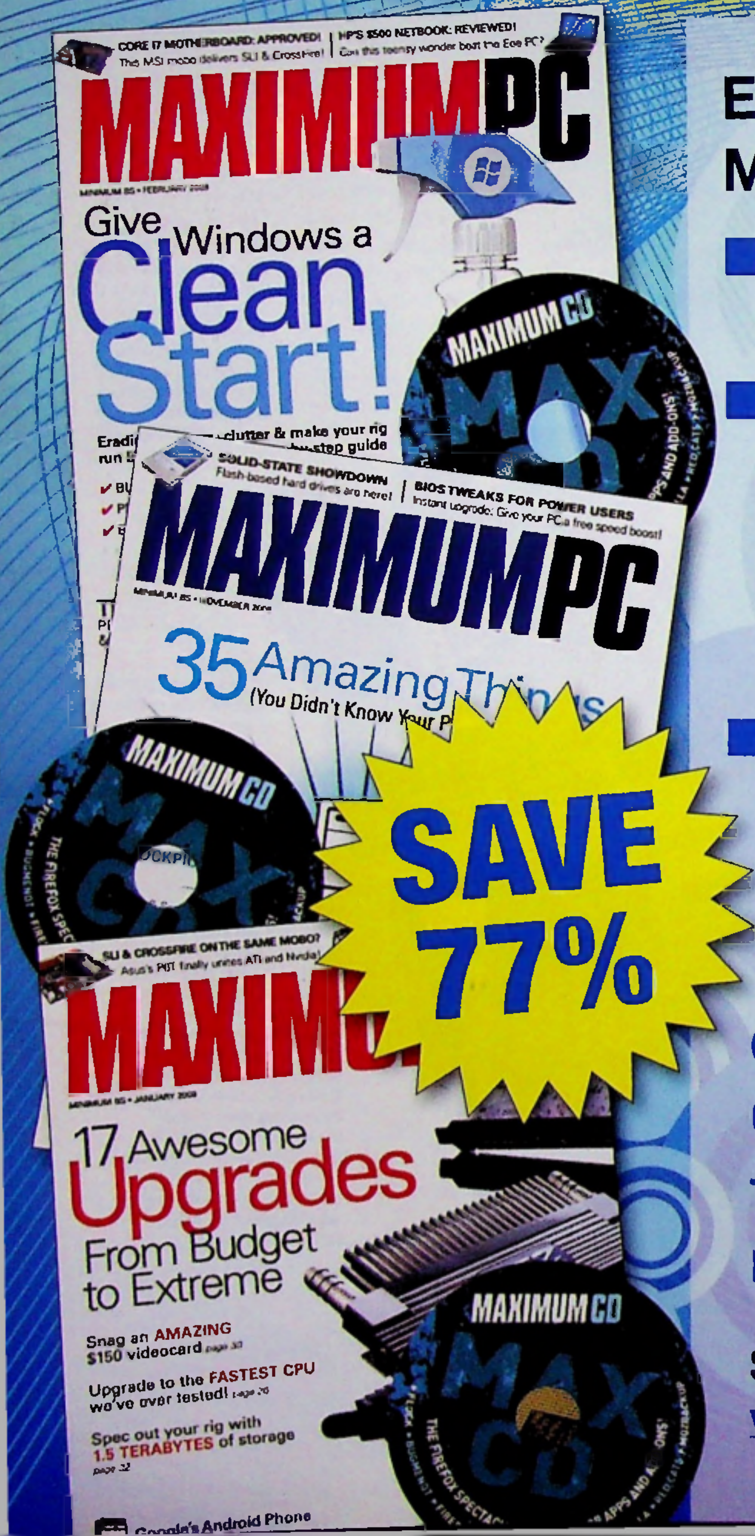
SDRAM MEMORY Two 64Mb SDRAM chips (the second is on the underside of the daughterboard) are used for program execution and data buffering.

INTELLON PROCESSOR Intellon's INT6000 handles the bulk of the data processing, including Ethernet, PCI, memory, and MPEG data-transport streams. It's HomePlug AV-compliant and serves as the bridge between power-line and Ethernet network topologies, delivering theoretical throughput of 200Mb/s. (Intellon's technology forms the basis of the IEEE P1901 standard. The company was acquired by Atheros in December 2009.)

SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

Unleash your PC's Potential...

With MAXIMUM PC


CORE I7 MOTHERBOARD: APPROVED!
The MSI mobo delivers SLI & CrossFire!
HP'S $500 NETBOOK: REVIEWED!
Can this teensy wonder beat the Eee PC?
MAXIMUM PC
Give Windows a Clean Start!
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Flash-based hard drives are here!
BIOS TWEAKS FOR POWER USERS
Instant upgrade: Give your PC a free speed boost!
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35 Amazing Things
(You Didn't Know Your P
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SAVE 77%
SLI & CROSSFIRE ON THE SAME MOBO?
Asus's P6T finally unites ATI and Nvidia
17 Awesome Upgrades From Budget to Extreme
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Upgrade to the FASTEST CPU we've ever tested! page 26
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HOW TO

Step-by-Step Guides to Improving Your PC

THIS MONTH

66 PROTECT YOUR PC WITH HIJACKTHIS
68 CONVERT 2D MOVIES TO 3D
70 PRINT GIANT GOOGLE MAPS

BOOKMARKLET BENEFITS

ALEX CASTLE
ASSOICATE ONLINE EDITOR

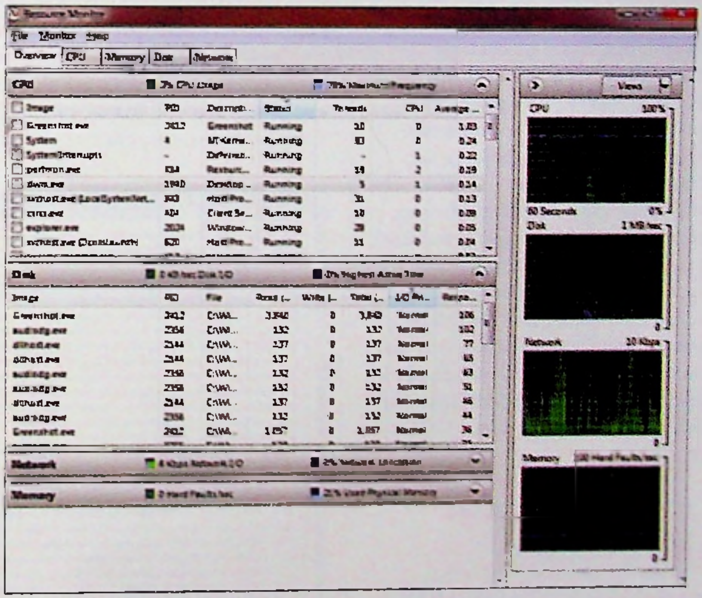
I like to customize my web browser with plugins as much as the next geek, but between the installation, updating, and compatibility issues, sometimes it's a bit of a hassle. That's why bookmarklets are great. If you're not familiar with them, bookmarklets are like mini-plugins for your browser—little snippets of javascript code that your browser saves as a bookmark. To "install" a bookmarklet, you just drag it onto your bookmark bar. To run it, just give it a click.

One of my favorites is the Google Reader bookmarklet (http://bit.ly/18R1nM), which subscribes you to whichever RSS feed you're viewing. I also like the Bit.ly bookmarklet (http://bit.ly/fK5e), which lets you shorten a URL without leaving the page, and a bookmarklet called Readbility (http://bit.ly/Dpnsv), which can alter any online article to use your preferred formatting.

SUBMIT YOUR IDEA Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.

WINDOWS TIP OF THE MONTH

Access the Resource Monitor



You've probably used the Windows Task Manager, but did you know that there's a more advanced version available in Windows Vista and 7 called the Resource Monitor? To access a ton of extra information about your CPU, RAM, disk, and network usage, click the Resource Monitor button in the Task Manager's Performance tab.

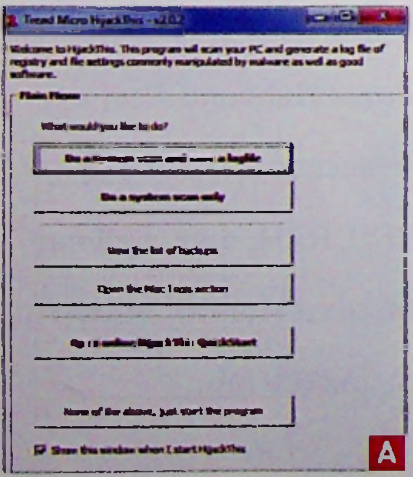
Decimate Stubborn Malware with HijackThis!

Trying to fix a badly infected PC without HijackThis is sort of like going into surgery without a scalpel; this free utility is the only tool for the job when all other measures fail. New spyware strains and increasingly complex viruses emerge every day, and your PC's immune system (i.e., antivirus software) isn't always able to keep up. And if you're performing emergency surgery on someone else's PC, you may find that they didn't have any AV software installed to begin with.

No matter how bad the infection, HijackThis gives you the means to dig deep into Windows to root out whatever it is that's wreaking havoc. It's not a cure-all, however, or even a cure-little. In fact, HijackThis doesn't cure anything on its own. What HijackThis does do is give you a snapshot of the system's registry and file settings, putting particular emphasis on the browser. It doesn't discern between safe and malicious settings, so it's possible to unintentionally inflict real harm if you don't know what you're doing. Follow along as we show you how to properly wield HijackThis on an ailing machine. —PAUL LILLY

1 DOWNLOAD AND RUN HIJACK THIS

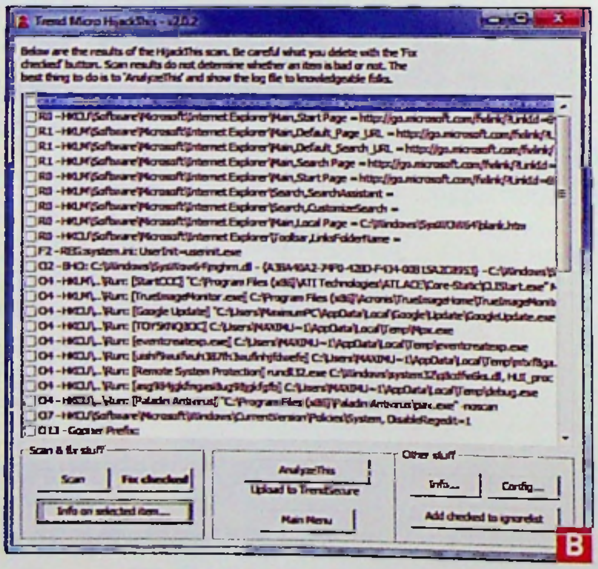
Originally developed by Dutch programmer Merijn Bellekom, HijackThis has since been acquired by Trend Micro, a security firm better equipped to maintain and update the program. But don't worry, HijackThis is still free and you can download it at http://free.antivirus.com/hijackthis, where you'll find both a stable and beta version, the latter of which presumably has additional features and functionality. We haven't run into much trouble using the beta, but it's currently only available as an installer. With the stable version, you have the option of downloading just the executable and plopping it on your USB thumb drive.


Trend Micro HijackThis - v2.0.2

Welcome to HijackThis. This program will scan your PC and generate a log file of registry and file settings commonly manipulated by malware as well as good software.

Main Menu
What would you like to do?
Do a system scan and save a logfile
Do a system scan only
View the list of backups
Open the Misc Tools section
Open online HijackThis QuickStart
None of the above, just start the program
☑ Show this window when I start HijackThis
A

Once installed, fire up the program and choose "Do a system scan and save a logfile" (image A). After you do this, you should see a bunch of seemingly obscure settings in the program's main window (image B), which will also be listed in a separate text file generated on the fly. Sometimes with the beta version of the app, the text file that appears will be empty; if that's the case, try using the stable release instead.


Trend Micro HijackThis - v2.0.2

Below are the results of the HijackThis scan. Be careful what you delete with the 'Fix checked' button. Scan results do not determine whether an item is bad or not. The best thing to do is to 'AnalyzeThis' and show the log file to knowledgeable folks.

Scan & fix stuff
Scan
Fix checked
Info on selected item...
AnalyzeThis
Upload to TrendSecure
Main Menu
Other stuff
Info...
Config...
Add checked to ignorelist
B

2 REVIEW THE RESULTS

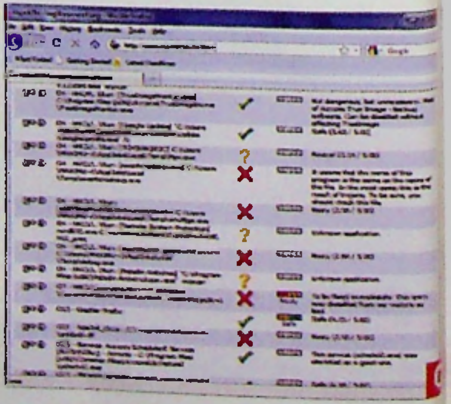
Keep in mind what we said earlier: HijackThis doesn't discern between safe and malicious entries. Even on a badly infected system, many, if not most, of the settings will be legit and altering them could affect the functionality of your PC.

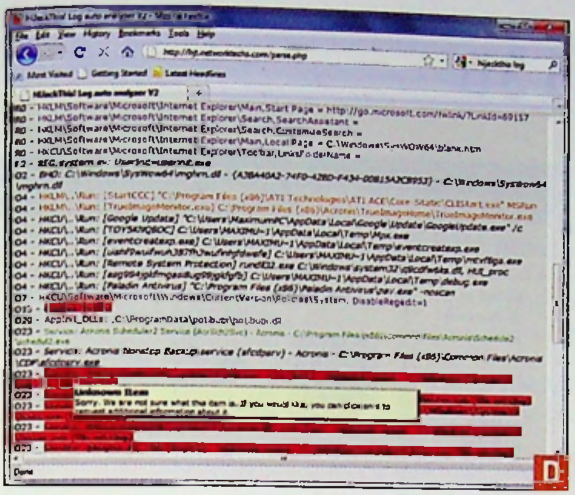
If you consider yourself a savvy user, you can scroll through the settings on your own and look for any suspicious or harmful settings. In some cases, these will be obvious, but not always, so you want to be sure to Google (or Bing) any entries you're unsure about before nuking them.

3 HOP ONLINE FOR A SECOND OPINION

No matter what your level of expertise, it never hurts to get a second opinion. One way to do this is by posting your log contents to a trusted PC tech-support forum. Mash the AnalyzeThis button at the bottom of the HijackThis log file to see a list of forums to choose from, or just hop over to the forums at MaximumPC.com.

If you strike out on a bulletin board or need instantaneous feedback, try the German website www.hijackthis.de. Just copy your entire log contents to your clipboard (right-click > select all > copy), paste it into the site's textbox, and press the Analyze button. Within a few moments, the





site will spit out the results and alert you to any potential problem areas (image C). Anything with a green checkmark is most likely safe, while the opposite holds true for any red Xs that are displayed. You may also see orange question marks, which are unknown files or entries that require further investigation.

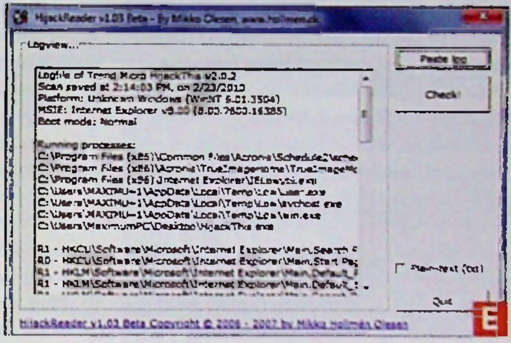
Rather than toss all your eggs in one basket, double-check these results by heading over to http://hjt.networktechs.com. Just like before, you'll paste your log file's contents and press the Parse button. All the results are color coded so you can see any potential pitfalls at a glance (image D). Hover your mouse cursor over these to learn why they're being flagged and what the recommended course of action is.

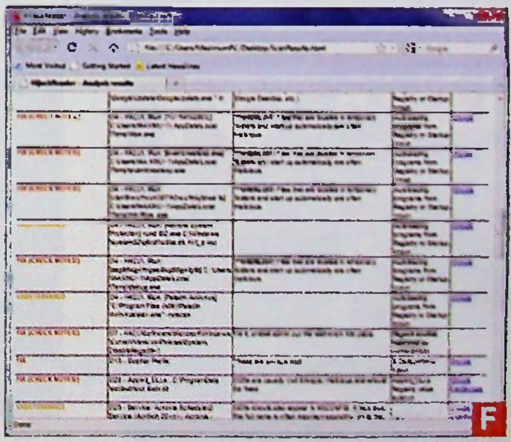
4 GET OFFLINE HELP WITH HIJACK READER

The problem with relying on a website to sift through your HijackThis log is that an infected PC doesn't always grant you access to the Internet. And even in cases when you are able to hop online, your web browsing attempts might be constantly rerouted, or pages could load too slowly to be of any help.

In this case, arm yourself with HijackReader (http://bit.ly/dAOLK8), another free third-party app that works in conjunction with HijackThis. There's no installation necessary—just unzip the archive to your hard drive or portable flash drive and run HijackReader.exe. Copy the HijackThis log file to your clipboard and mash Paste log, followed by the Check! button (image E).

When HijackReader finishes, it will save the results as an HTML file and prompt you to give it a name. Open this file to see the results (image F). HijackReader tends to know less about individual entries than the online sites do, but for the ones it does recognize, it tends to be a bit more informative. No matter which method you use (or combination thereof), it's a good idea to double-check any iffy entries with Google before you go blasting away registry and system settings.





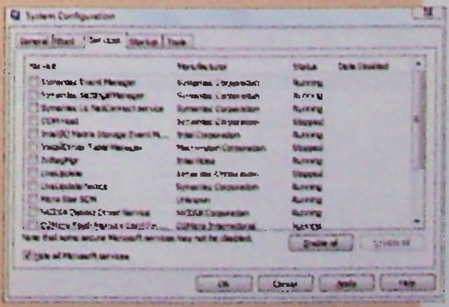
TROUBLESHOOTING

Diagnose Your PC with a Clean Boot

Still having trouble weeding out problematic processes? Try identifying the culprit with a clean boot. To perform a clean boot in Windows Vista or 7, do the following:

Open the System Configuration Utility by typing msconfig into the Start Search Bar, and click the Selective Startup radial button. Click the Services tab, then select Hide All Microsoft Services and click Disable All. Restart your computer—if your problem is solved, then its cause is one of your startup services.

To figure out *which* service is the culprit, go back into the System Configuration Utility, re-enable half of the services you disabled, and reboot. If the problem is back, then the guilty party is one of the services you just enabled. If it isn't, then it's one of the other half. By repeating this halving process several times, you'll be able to pinpoint the troublemaker.



Convert 2D Movies to 3D

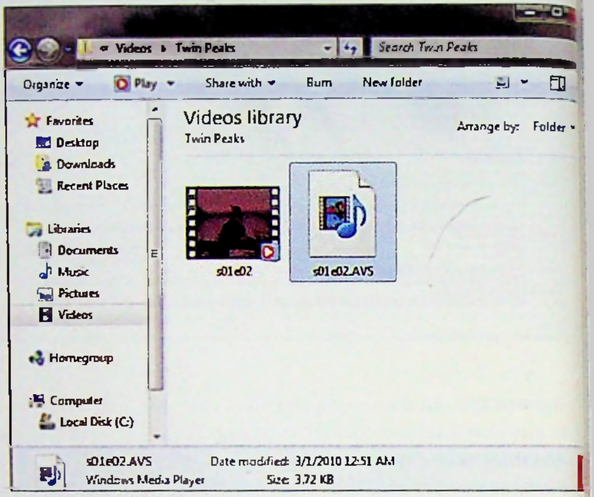
Unless you've been living under a rock for the last year, you know that 3D is this year's entertainment buzzword. With 3D blockbusters like *Avatar* scoring megabucks in the theaters, 3D cinema's jump to the living room is all but a foregone conclusion. But where does that leave all your old 2D files and DVDs?

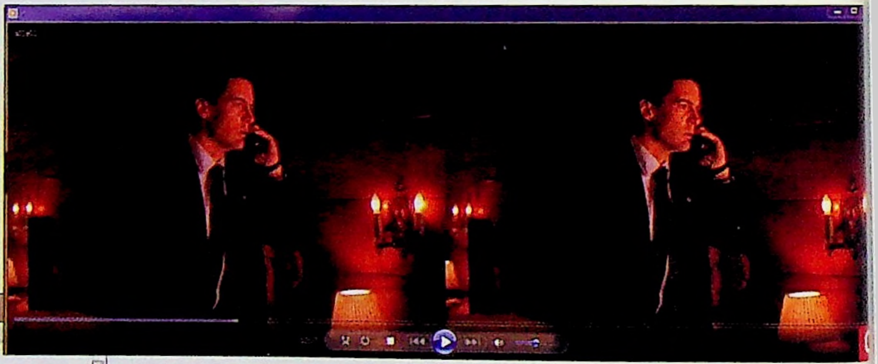
Thanks to a couple of very cool programs and some clever scripting, there's hope for them yet. In this article, we're going to show you how to use the free programs AviSynth and VirtualDub, along with a script from the 3D Vision Blog, to give any 2D film the 3D treatment. —ALEX CASTLE

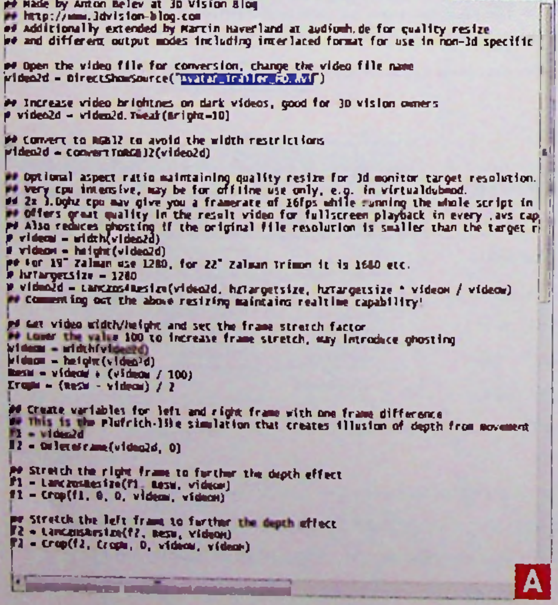
1 CONVERT TO 3D WITH AVISYNTH

To convert our movies to 3D, we're going to start with a program called AviSynth, so point your browser to http://bit.ly/2EO5A2 and download the newest version, then run the installer. You're probably used to running most new programs after you install them, but don't bother trying with AviSynth—it doesn't have a user interface. Instead, it functions as a codec, allowing media viewers such as Windows Media Player to understand AviSynth scripts, in the form of AVS files.

As you might have guessed, we're going to use one such AVS script to upconvert our 2D file to 3D. It's not magic—the script simply exploits some common visual cues to take a decent stab at applying a 3D effect to a 2D movie. The script was written by the author of the 3D Vision Blog, and is available here: http://bit.ly/6a1fgp. Go to the site, copy the script (it's the first big chunk of code) and paste it into Notepad.







```
## 2D to 3D Realtime Video Conversion Avisynth script v0.3b
## Made by Anton Belev at 3D Vision Blog
## http://www.3dvision-blog.com
## Additionally extended by Martin Haverland at audiomh.de for quality resize
## and different output modes including interlaced format for use in non-3d specific

## Open the video file for conversion, change the video file name
video2d = DirectShowSource("Avatar_Trailer_HD.avi")

## Increase video brightnes on dark videos, good for 3D Vision owners
# video2d = video2d.Tweak(Bright=10)

## Convert to RGB32 to avoid the width restrictions
video2d = ConvertToRGB32(video2d)

## Optional aspect ratio maintaining quality resize for 3d monitor target resolution.
## Very cpu intensive, may be for offline use only, e.g. in virtualdubmod.
## 2x 3.0ghz cpu may give you a framerate of 16fps while running the whole script in
## Offers great quality in the result video for fullscreen playback in every .avs cap
## Also reduces ghosting if the original file resolution is smaller than the target r
# videoW = width(video2d)
# videoH = height(video2d)
## For 19" Zalman use 1280, for 22" Zalman Trimon it is 1680 etc.
# hzTargetSize = 1280
# video2d = Lanczos4Resize(video2d, hzTargetSize, hzTargetSize * videoH / videoW)
## Commenting out the above resizing maintains realtime capability!

## Get video width/height and set the frame stretch factor
## Lower the value 100 to increase frame stretch, may introduce ghosting
videoW = width(video2d)
videoH = height(video2d)
ResW = videoW + (videoW / 100)
CropW = (ResW - videoW) / 2

## Create variables for left and right frame with one frame difference
## This is the Pulfrich-like simulation that creates illusion of depth from movement
f1 = video2d
f2 = DeleteFrame(video2d, 0)

## Stretch the right frame to further the depth effect
f1 = LanczosResize(f1, ResW, videoH)
f1 = Crop(f1, 0, 0, videoW, videoH)

## Stretch the left frame to further the depth effect
f2 = LanczosResize(f2, ResW, videoH)
f2 = Crop(f2, CropW, 0, videoW, videoH)
```

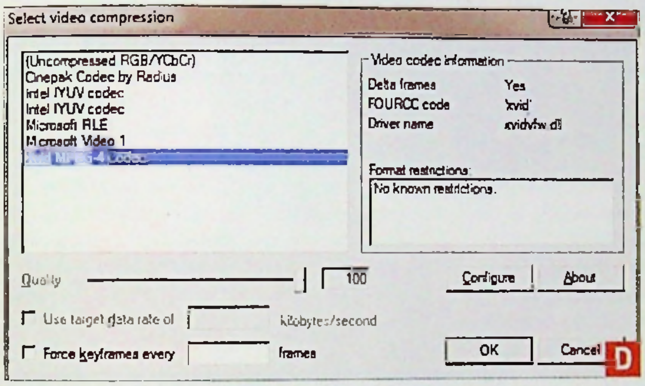
Before we can use the script, it needs a little customization. First, change the filename at the beginning of the script from "Avatar_Trailer_HD.avi" to the filename of the video you want to upconvert (image A). Save the script with an .avs filename extension to the same directory as the video file you're converting (image B).

At this point, you're all set to view your movie in 3D. To do so, simply open a media player that works with AVS scripts (such as Windows Media Player) and tell it to open your .avi file. Assuming you've done everything right so far, you should see an extra-wide version of your video, with two slightly different frames playing side by side (image C). This is the 3D file, formatted to play with Nvidia's 3D Vision technology.

If you would prefer to view your movie in anaglyph (red/cyan) 3D for use with a pair of filter glasses, you need to make a quick modification to your script. Find the line in the script that says `StackHorizontal(f2, f1)` and comment it out by adding a # to the beginning of the line. Then, uncomment the line that says `# MergeRGB (f2.ShowRed, f1.ShowGreen, f1.ShowBlue)` by removing the #.

2 SAVE YOUR 3D VIDEO WITH VIRTUALDUB

So, we're looking at our video in 3D—we must be done, right? Not quite. AviSynth works in real time, synthesizing an AVI (get it?) from a source file and a script, frame by frame, as the media player requests those frames. This is hard on your CPU, and means that if you want to view the file on any other computer, you'll need to install AviSynth first. Instead, we'll now show you how to permanently save the 3D video to your hard drive.


Select video compression

(Uncompressed RGB/YCbCr)
Cinepak Codec by Radius
Intel IYUV codec
Intel IYUV codec
Microsoft RLE
Microsoft Video 1
Xvid MPEG-4 Codec

Video codec information
Delta frames: Yes
FOURCC code: 'xvid'
Driver name: xvidvfw.dll

Format restrictions:
No known restrictions.

Quality: 100

☐ Use target data rate of kilobytes/second
☐ Force keyframes every frames

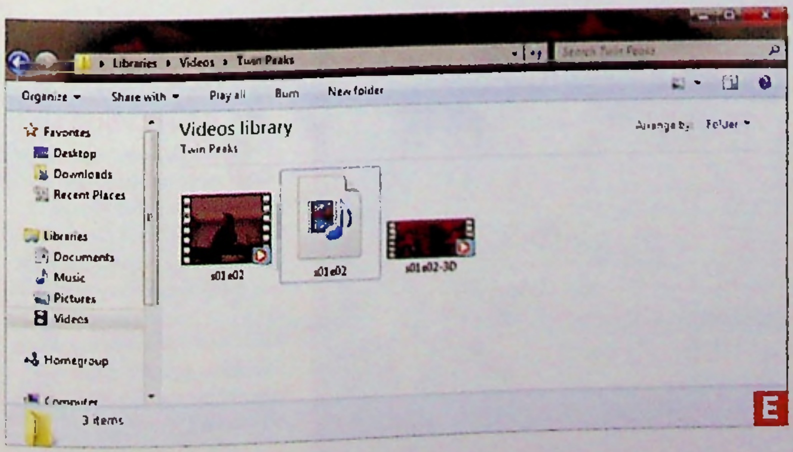
Configure
About
OK
Cancel
D

To save the movie, you'll need a program called VirtualDub. VirtualDub is a lightweight, open-source video editor that is especially good at quickly re-encoding videos. Download the program from http://virtualdub.org and extract the program.

The next step of the process is to make sure that VirtualDub has the tools it needs to make a high-quality copy of the 3D movie. More specifically, it needs codecs—one for video and one for audio. The Xvid MP4 and LAME MP3 codecs are excellent, open-source examples of each. If you don't already have these codecs installed for use with some other media program, you'll need to get them now. The Xvid codec can be found at www.xvid.org, and the LAME codec can be downloaded here: http://bit.ly/8VHgfr. Once you've downloaded both, run the installers to register the codecs in Windows.

Set VirtualDub to use Xvid by going to Video > Compression… and then selecting Xvid MPEG-4 Codec (image D). Set it up for audio by first clicking Audio > Full processing mode and then clicking Audio > Compression… and selecting MPEG Layer 3.

Finally, open the .avs file for your 3D video, and click File > Save as AVI. Give your file a name, and you're done (image E).


Libraries ▸ Videos ▸ Twin Peaks
Organize
Share with
Play all
Burn
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
Videos library
Twin Peaks
Arrange by: Folder
s01e02
s01e02
s01e02-3D
3 items
E

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Print Giant Google Maps

Google Maps is great—it's got tons of convenient, frequently updated information about pretty much any place in the world. There's just one problem: It's stuck on the Internet. Or at least it was. But now, with Google Map Buddy, you can print Google Maps of any size, whether you want to put together your own old-fashioned road map or make a giant geographical mural for you wall. In this article, we'll show you how to use this neat tool. —ALEX CASTLE

1 DOWNLOAD GOOGLE MAP BUDDY

To get started, download Google Map Buddy (http://bit.ly/42Jvqj). You don't need to install it, just unzip it and run the program.

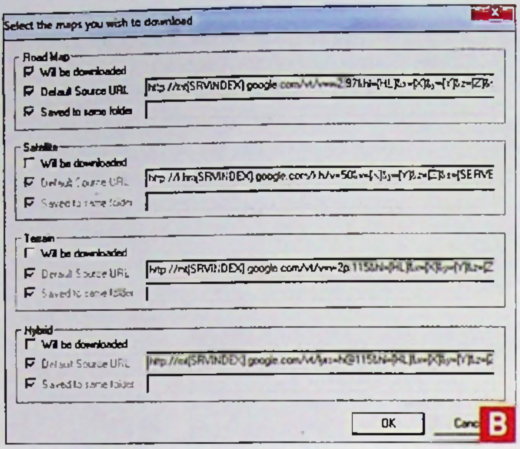
2 GENERATE YOUR MAP FILES

The first thing you'll see is a toolbar that prompts you to go to Google Maps. Click this button, then hit Go after selecting your country, and Google Map Buddy will open Google Maps in its own browser. Using this browser, find an area you would like to map, and hit the Select Area button. This will allow you to draw a rectangle around the area you would like to include in your map.

Once you've selected your map's area, a drop-down menu will appear, prompting you to select a zoom level (image A). In the upper-right corner of the Toolbar, you'll see a zoom-level number that corresponds to how zoomed in you are in Google maps. The zoom number you pick from the drop-down must be larger than the zoom number displayed in the upper-right, and the greater the difference between the two, the larger your printable map will be. The number of printed pages goes up exponentially as the difference in zoom levels increases, so start small and work your way up.

Finally, select Create Map Image from the Toolbar. Map Buddy will prompt you to save the map image as a series of map tile .png files, and one large, stitched-together composite image. Be sure to create a folder for your map, because depending on the zoom level, you may end up with a lot of map tiles.

Once you've named and saved your file, Map Buddy will prompt you to select the maps you wish to download. You can choose Road Map, Satellite, Terrain, or Hybrid (image B). If you're planning to print out a map for your car, for instance, a road map will suffice. So, check "Will be downloaded" next to road map, and select OK. Map Buddy will ask if you want to delete the individual map tiles in your output folder. Since you'll most likely want to print these tiles as individual pages, select No.

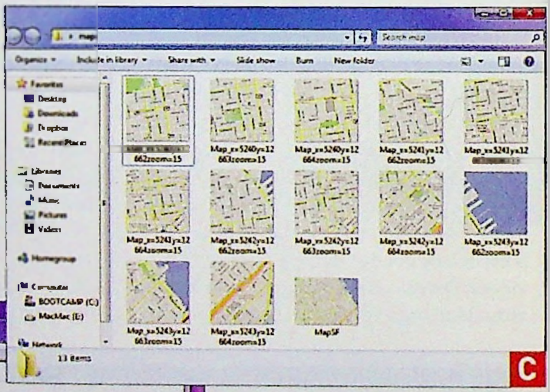

Select the maps you wish to download

Road Map
☑ Will be downloaded
☑ Default Source URL
☑ Saved to same folder

Satellite
☐ Will be downloaded
☑ Default Source URL
☑ Saved to same folder

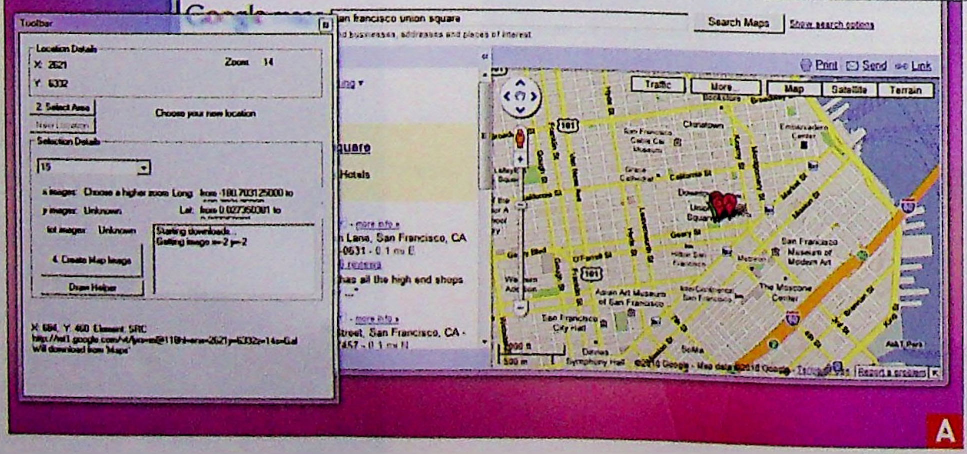
Terrain
☐ Will be downloaded
☑ Default Source URL
☑ Saved to same folder

Hybrid
☐ Will be downloaded
☑ Default Source URL
☑ Saved to same folder



3 PRINT YOUR MAP

Finally, you're ready to print out all the individual map tiles (image C). Since most printers can't print all the way to the edge of the page, you'll need some way to trim off the white borders around the sides before you tape the sheets together—a paper cutter or a razor blade and a straight edge will work. ⏻


Untitled - Google Map Buddy

Toolbar

Location Details
X: 2621
Y: 6332
Zoom: 14

Choose your new location

Selection Details
15
x images: Choose a higher zoom
y images: Unknown
tot images: Unknown
Long: from -180.703125000 to
Lat: from 0.0273600381 to

Starting downloads...
Getting image x=-2 y=-2

X: 684, Y: 460 Element: SRC
Will download from "Maps"

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[illegible]

REVIEWS

Tested. Reviewed. Verdictized.

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XSPC
LG
DIGITALSTORM
BLACKOPS EDITION

Digital Storm HailStorm

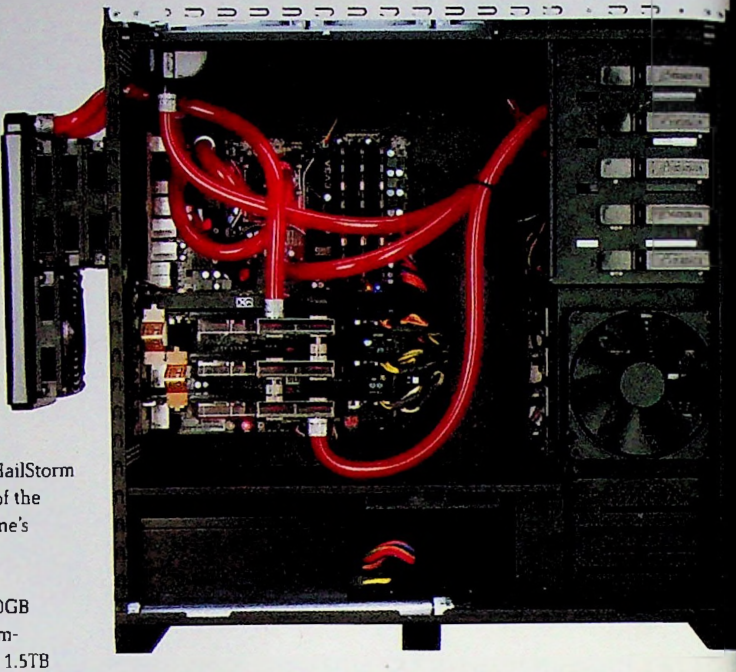
Hexa-core system has its way with our benchmarks

When we introduced our new system benchmarks last month, we thought it might be at least six months before review machines began stomping the holy crap out of them. Unfortunately for us, Digital Storm couldn't wait to pile it on. The company has unleashed a rig so damned powerful that we're wondering if our new benchmarks and zero-point system aren't already obsolete.

But what would you expect of a rig named HailStorm Black Ops Edition that's equipped with Intel's new hexa-core Core i7-980X CPU? The Core i7-980X normally clocks in at 3.33GHz, but Digital Storm pushes the CPU to 4.4GHz, with the help of an impressive dual-radiator and large ID hose water-cooling system. For graphics, the company combines three Radeon HD 5870 cards, which have been clock-bumped as well, thanks to the beefy water-cooling. Along with the CPU and GPU cooling, Digital Storm water-cools the chipset and voltage regulators on the EVGA X58 Classified motherboard. We still haven't reviewed one of these EVGA boards, but its selection by several high-profile OEMs is making us want in on that action. Get the hint, EVGA? We should also mention that for the amount of hardware the HailStorm packs, it's one of the quietest machine's we've tested.

A single second-gen 160GB Intel X25-M combined with two 1.5TB Seagate Barracudas handle all storage matters. A massive 1,500W Silverstone PSU runs the whole show. There are other amenities such as a Sound Blaster X-Fi Titanium Fatal1ty Champion soundcard, an LG Blu-ray combo drive, and 6GB of DDR3/1600 bearing the Digital Storm brand. The case is Corsair's killer 800D enclosure with a custom high-gloss paint job. If we had to ding the machine for anything, it's that the paint job, while nice, certainly isn't the caliber of those found on Falcon Northwest's or Smooth Creations' PCs.

Even though our zero-point rig is no slouch—a Core i7-920 overclocked to 3.5GHz, with a Radeon HD 5970 and Intel G2 SSD—the HailStorm smashed it to pieces in the benchmarks. In our Sony Vegas Pro 9 video-editing test, the HailStorm was a shocking 45 percent faster. In MainConcept Reference 1.6, the HailStorm achieved a 46 percent faster encode. And in the photo arenas of Lightroom 2.6 and ProShow 4, the HailStorm turned in scores that were 24 percent and 27 percent faster, respectively. Our Radeon HD 5970, the most powerful card on the planet, was no match against the HailStorm's three Radeon HD 5870s, which bested our rig by 83 percent in STALKER: CoP and 75 percent in Far Cry 2.



Despite a full rack of hardware and off-the-scale performance, the HailStorm is amazingly quiet.

You can see why we're ready to start crying about our smashed and shattered benchmarks. If the first performance rig we test can make such a mockery of our tests, we can only look forward to further humiliation. Sigh.

So, what's not to like? Two glaring things about the HailStorm make it less than perfect. The first is the rig's weight. We've actually hurt our backs lifting previous Digital Storm systems and this one is just as heavy. Let's just say you should plan to have help unpacking your new rig. The second imperfection is also painful: the price. At $7,818, the HailStorm ain't no big-box impulse buy.

But that's always been the story, hasn't it? To get this kind of benchmark-crushing performance, you have to pay to play. The HailStorm makes it well worth it.

—GORDON MAH UNG

SPECIFICATIONS

Processor	Intel 3.33GHz Core i7-980X (overclocked to 4.4GHz)
Mobo	EVGA Classified X58
RAM	6GB DDR3/1600 in tri-channel mode
Videocard	Three ATI Radeon HD 5870 in CrossFireX
Soundcard	X-Fi Titanium Fatal1ty Champion
Storage	160GB X25-M Intel SSD, two Seagate Barracuda 7200.12 1.5TB hard drives
Optical	LG Blu-ray combo drive, Lite-on 22x DVD+R
Case/PSU	Corsair 800D / Silverstone 1,500W PSU

BENCHMARKS

	ZERO POINT	
Vegas Pro 9 (sec)	3,049	2,103
Lightroom 2.6 (sec)	356	286
ProShow 4 (sec)	1,112	873
Reference 1.6 (sec)	2,113	1,450
STALKER: CoP (fps)	42.0	77.0
Far Cry 2 (fps)	114.4	200.6

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a quad-core 2.66GHz Core i7-920 overclocked to 3.5GHz, 6GB of Corsair DDR3/1333 overclocked to 1750MHz, on a Gigabyte X58 motherboard. We are running an ATI Radeon HD 5970 graphics card, a 160GB Intel X25-M SSD, and the 64-bit version of Windows 7 Ultimate.

MAXIMUMPC KICK ASS!

VERDICT 9

DIGITAL STORM HAILSTORM

+ HEXAGON	**− PENTAGRAM**
Six-core processor; quiet; tri-CrossFireX!	Weighs as much as a small car—costs as much, too.

$7,818, www.digitalstormonline.com

Kingston SSDNow V+

No, we haven't already reviewed this one

It seemed like deja vu to us, too—didn't we review a Kingston SSDNow V+ as recently as December? Turns out we're not crazy (at least in this respect); that was the first-generation SSDNow V+, built on the same Samsung controller as the Corsair P256. The second-gen SSDNow V+, by contrast, uses Toshiba's T6UG1XBG SSD controller, which features TRIM support (for clearing deleted blocks) and has theoretical maximum reads and writes of 230MB/s and 180MB/s, respectively.

On the outside, the SSDNow V+ looks, well, like every other SSD out there. Unlike most of them, however, the second-gen SSDNow V+ comes as a Performance Upgrade Kit, which includes Acronis-based drive-cloning software, a USB external enclosure, a SATA cable, and adapter rails for 3.5-inch hard drive bays. Sure, you can get all of those things elsewhere, but it's a thoughtful kit for the upgrader.

Toshiba's controller, like the Indilinx Barefoot controller that powers the Patriot Torqx, contains 128MB DDR DRAM cache to eliminate jitters, and we didn't experience any during testing. In our h2benchw tests, the SSDNow V+ achieved average sustained read speeds greater than 180MB/s, and average sustained writes of 175.3MB/s, with burst reads up to 223MB/s—close to the claimed maximum. The 128GB Patriot Torqx, by contrast, got 167.6MB/s reads and 164.4MB/s sustained writes. The Torqx still triumphs in random-access times, though—the Kingston's random reads averaged .28ms to the Torqx's .11ms, while average random writes took .4ms, to the .3ms random writes offered by the Torqx. Of course, differences in the tens of milliseconds won't be noticeable to the average user. PCMark Vantage scores and Premiere Pro encoding times were similar to those of the Torqx.

Astute readers will note that these scores aren't the same as previously given for the Torqx—we've recently upgraded our SSD test station and re-tested the Torqx under the same conditions as the Kingston drive. We've also moved to Windows 7 for all of our benchmarks, which tends to give slightly lower sustained speeds in our benchmarks than does Windows XP.

The second-gen Kingston SSDNow V+ is a strong performer and it gets brownie points for the included upgrade kit, as well as native TRIM support. It doesn't offer a huge jump in performance, but users won't be disappointed. And it's less expensive than many other 128GB SSDs with similar performance.

—NATHAN EDWARDS

Kingston
TECHNOLOGY
128GB
SSDNOW V+ SERIES
SNVP325-S2/128GB
Assembled in PHILIPPINES

Kingston's second-gen SSDNow V+ is upgrade-friendly—it comes with an external USB enclosure, cloning software, cables, and 3.5-inch adapter rails.

BENCHMARKS

	Kingston SSDNow V+	Patriot Torqx
Capacity	128GB	128GB
Average Sustained Transfer-Rate Read (MB/s)	**180.1**	167.6
Average Sustained Transfer-Rate Write (MB/s)	**175.3**	164.4
Random-Access Read (ms)	28	**.11**
Random-Access Write (ms)	40	**.30**
HDTach Burst Speed (MB/s)	**223.9**	144.4
Premiere Pro (sec)	**613**	636
PCMark Vantage x64 Overall	22,019	**23,626**

Best scores are bolded. All drives re-tested on our new hard drive test rig: a 2.66GHz Intel Core i5-750 on an Asus P7P55D-Premium motherboard. HDTach 3.0.1.0, h2benchw, PCMark Vantage x64, and Premiere Pro CS3 benchmarks were obtained in 64-bit Windows 7 Professional.

VERDICT 8

KINGSTON SSDNOW V+

+ KING GEEDORAH	− KING KOOPA
TRIM support; fast reads and writes; included upgrade and connectivity kit; competitive pricing.	Not world-changing; random-access times lag behind Indilinx and Intel controllers.

$340, www.kingston.com

XFX Radeon HD 5870 XXX Edition

Overclocked to be the fastest card you can buy today

We've never been major advocates of GPU overclocking, as the minor gains you achieve often don't justify the added heat and instability. But there's a clear difference between Billy Joe doing a maximum overclock on his GPU and a vendor overclocking the part at the factory.

So when XFX offered up its XXX Edition of the already-fast Radeon HD 5870, we were naturally curious. XFX pushes the HD 5870 to 875MHz (3 percent over the stock 850MHz) and juices the memory to 1,300MHz (8.3 percent over the stock 1,200MHz). At first blush, a 3 percent core overclock seems minimal. Given that the card costs about $430, versus about $405 for the stock XFX variant, is it worth the extra jingle?

To find out, we compared the performance of the XXX Edition to a standard XFX Radeon HD 5870, which is a stock card in every respect. Save for clock speeds, the two cards are identical: memory (1GB), ports (two DVI, one DisplayPort, one HDMI), and the reference cooling system. Because of the speed bumps to the XXX Edition's core and memory clocks, its system idle power usage varies from the stock card, reaching 148W versus 141W.

Our tests were run on a Core i7-975 Extreme Edition with 6GB of DDR3/1333 and 64-bit Windows 7 Ultimate. The PSU is a Corsair TX850W 850W unit. We ran the benchmarks at 1920x1200, eye candy maxed out, with and without 4x AA enabled. The scores look pretty much as we expected, given the slight core and more substantial memory clock boost.

Yes, the XFX Radeon HD 5870 XXX Edition wins in all of the game benchmarks, but the margins, while consistent, are so small as to be almost meaningless. It is the first time we've seen a single videocard score greater than 100fps in Far Cry 2 at 1920x1200 (with AA disabled). On average, the XXX Edition yields a 4 percent gain in performance for a 6 percent increase in price.

For consumers who are worried about the long-term impact of an overclocked card, XFX's warranty might reassure you. It's simply the best in the business at five years, with the ability to transfer the warranty once, should the original owner resell the card. The card is definitely fast, and if you have to have the fastest GPU on the block, you may find the uptick worth it. But the standard card is a better deal in the end—almost as fast, more power-efficient, and lower-priced. **–LOYD CASE**

BENCHMARKS

	Radeon HD 5870 XXX	Radeon HD 5870
3DMarkVantage Extreme	**9,181**	8,312
Battle Forge / AA on (fps)	**33**	31
FC2 / Action, AA on (fps)	64	63
FC2 / Ranch Long, AA on (fps)	**75**	72
HAWX / AA on (fps)	**84**	81
STALKER CoP / AA, tess on (fps)	**42**	39
Crysis / AA on (fps)	32	32

Best scores are bolded. Our test system uses a 3.33GHz Core i7-975 Extreme Edition in an Asus Rampage II Extreme X58 motherboard, 6GB of Corsair DDR3/1333, a Corsair TX650 PSU, a Thermalright Ultra-120 Extreme cooler, a 1TB Seagate 7200.12 hard drive, and 64-bit Windows 7 Ultimate. All test runs were performed at 1920x1200.

VERDICT **8**

XFX RADEON HD 5870 XXX EDITION

+ X GAMES	**– VIN DIESEL**
Fastest single-GPU card we've tested, XFX warranty.	Pricier than stock cards; higher idle power usage; stock cards are plenty fast.

$430, www.xfxforce.com

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HD 5870
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• 945	$719

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• 945	$829

AMD Athlon™ II X4 Quad-Core Processor	
• 630	$779
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• 250	$744

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• 965	[illegible]
• 955	[illegible]
• 945	$874

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• 630	$824
AMD Athlon™ II X2 Dual-Core Processor	
• 250	$789

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• [illegible]	[illegible]
• [illegible]	[illegible]

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Asus N61J

Optimus and Arrandale join forces

In and of itself, the Asus N61J wouldn't normally enter our radar. Let's face it: A $900 16-inch desktop replacement is wholly pedestrian—an affront to the sensibilities of most power users. But the N61J has the distinction of boasting one unique feature that, at the time of this writing, wasn't available in a more enthusiast-class rig, but which most enthusiasts are sure to take interest in: Nvidia's brand-new Optimus technology, which changes the landscape of hybrid graphics.

To summarize, hybrid graphics make it possible to switch between a notebook's integrated graphics and discrete videocard based on need. The concept is hardly new, but Optimus streamlines it. Rather than the user having to shut down applications, manually enact the switch, and then reboot—a nuisance no matter how you slice it—Optimus intuits the correct graphics solution for the task at hand and implements it seamlessly.

In our experience with the N61J, the technology worked as advertised. When running our gaming benchmarks, the discrete card kicked in without any effort on our part. Unfortunately, Optimus couldn't elevate the N61J's gaming performance beyond middling. The notebook's GeForce GT 325M might be based on a new GPU architecture using a smaller 40nm process, but the mainstream card is still an amateur compared to the older GTX 260M in our zero-point notebook. Moderately demanding games like Far Cry 2 are playable, to be sure, but only when run at the notebook's native 1366x768 resolution with quality set at medium, which yielded 36.75fps.

The N61J is more impressive at productivity chores. Its 2.26GHz Core i5-430M is part of Intel's new Arrandale family of mobile processors. It's built on the same 32nm process as Intel's Clarkdale desktop procs, which include an integrated graphics chip in the CPU. There are numerous other improvements the Core i5 chips offer over the Core 2 Duo, with integrated memory controller, better power management, and HyperThreading among the most noteworthy. So, despite its 800MHz clock disadvantage, the Core i5-430M performed slightly better than our zero-point's 3.06GHz Core 2 Duo Mobile T9900 CPU in all the content creation benchmarks that are multithread-friendly. Photoshop shows no such bias, leaving the older Core 2 Duo out front.

Still other features that make the N61J attractive are a multitouch touch pad, a speaker that doesn't suck as much as some notebooks', one-touch volume controls, HDMI, eSATA, and integrated USB 3.0 in one of the notebook's three USB ports. Sadly, the two USB 2.0 ports are not close enough together to accommodate dual-head cables without use of an extension cable.

For its size, the N61J is quite manageable. It's fairly thin, and its lap weight of six pounds is half that of our 15.4-inch zero-point. Part of the weight savings might come from the N61J's battery. Given that the notebook features two power-saving technologies in Optimus and Arrandale, we expected a relatively long runtime, but the N61J barely surpassed the two-hour mark in our battery-rundown test, suggesting that its 8-cell battery is not all that burly.

If you want a desktop replacement that truly does everything, there are more powerful portables to be had, albeit at a higher price. But if you're looking to save some dough, and you're not a fanatic about gaming, the N61J is a pretty good bargain. **–KATHERINE STEVENSON**

VERDICT 8

ASUS N61J

+ GRAPPLE	**– LEMATO**
Optimus hybrid graphics; portable proportions; HyperThreading; USB 3.0.	Battery life isn't great; unfriendly to dual-head USB cables; mediocre at games.

$900, www.asus.com

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3 (sec)	1,320	1,260
Photoshop CS3 (sec)	153	164 (-6.7%)
Proshow Producer (sec)	1,524	1,482
MainConcept (sec)	2,695	2,453
Far Cry 2 (fps)	32.7	13 (-60.2%)
Call of Duty (fps)	58.2	25.5 (-56.2%)
Battery Life (min)	100.0	125

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero point notebook is an iBuypower M865TU with a 3.06GHz Core 2 Duo T9900, 4GB DDR3/1066 RAM, a 500GB Seagate hard drive, a GeForce GTX 260M, and 64-bit Windows 7 Professional. Far Cry 2 tested at 1680x1050 with 4x AA, Call of Duty 4 tested at 1680x1050 with 4x AA and anisotropic filtering.

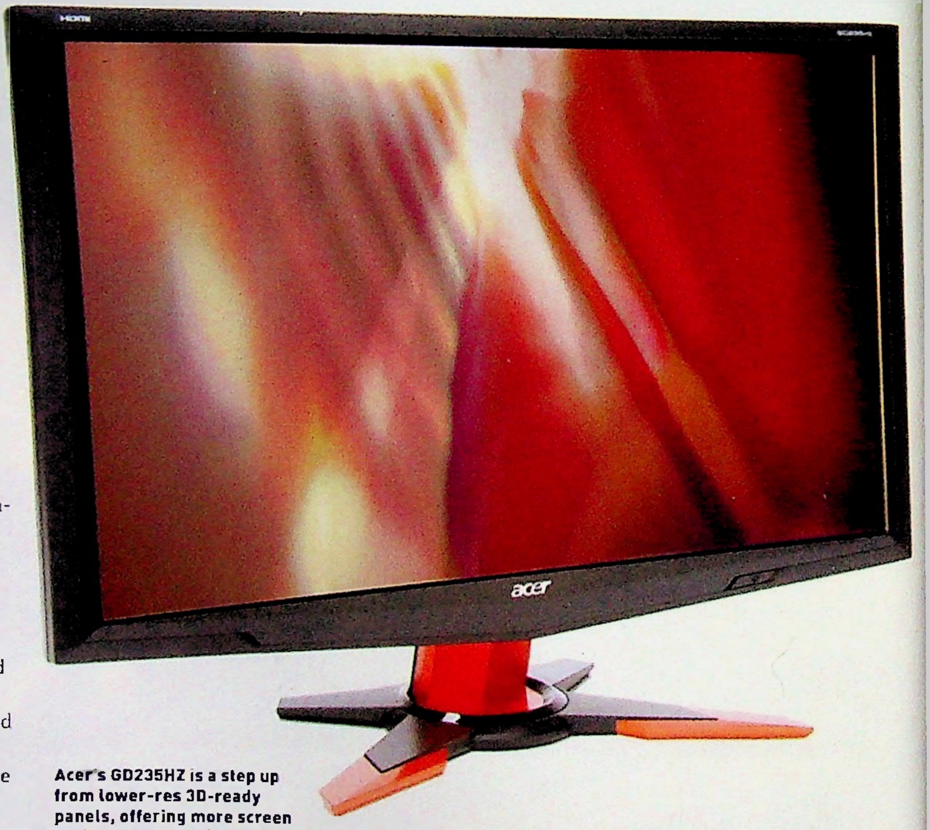
SPECIFICATIONS

CPU	2.26GHz Core i5-430M
RAM	4GB DDR3/1066
Chipset	Intel HM55
Hard Drive	500GB Seagate ST9500420AS (7,200rpm)
GPU	Nvidia GeForce GT 325M / Intel GMA graphics
Ports	VGA, HDMI, Ethernet, one USB 3.0, two USB 2.0, eSATA, two analog in/out, 5-in-1 media reader, Express Card/34 slot
Lap/Carry	6 lbs / 7 lbs

A glossy screen, rubberized palm rest, and chicklet keyboard lend upmarket touches to this budget notebook.

Acer GD235HZ

This second-generation 120Hz panel makes the leap to full HD



Acer's GD235HZ is a step up from lower-res 3D-ready panels, offering more screen real estate and a higher native res.

We can count on one hand the number of people we know who have bought into Nvidia's 3D Vision gaming system—those shutter goggles haven't exactly been selling like hotcakes.

The lackluster response to this 3D-gaming renaissance is no doubt due in part to the 3D Vision kit's $200 admission price. On top of that, early adopters were also likely put off by the technological limitations of the requisite 120Hz monitors—another $400 wallet-draining investment—which maxed out at just 22 inches and a paltry 1650x1080 resolution.

Acer's GD235HZ is a second-generation 120Hz panel that sheds those constraints, measuring 23.6 inches and running natively at 1920x1080 pixels.

In a pleasant surprise, the GD235HZ doesn't cost any more than last year's 22-inch $400 asking price. To keep the price in check, Acer omitted extras like USB ports and component inputs from this model. And aside from the 120Hz refresh rate, this is a pretty standard TN panel. Color fidelity fared respectably in our tests and contrast (rated at 1000:1) looked better in the darks than the lights. We didn't notice any color banding defects at various settings, either. But like most LCDs, we could spot a bit of backlight bleed along the edges of the screen, though this was only noticeable with the lights off and a very dark image on the screen. We also thought that text looked a little off, with very light shadowing between characters. Tweaking Windows 7's ClearType settings helped alleviate this issue.

But this monitor isn't for Photoshop artists or Excel monkeys—it was made for 3D gaming. So, it was no surprise that the extra real estate made a big difference in-game. The wider 16:9 aspect ratio helped improve the illusion of depth when we sat close enough that the sides of the screen were just beyond our peripheral vision. However, we encountered some ghosting in games, a familiar consequence of shutter-based 3D configurations. This was most apparent in scenes with high contrast, such as Modern Warfare 2's snow level.

Full-screen 3D videos downloaded from Nvidia's website looked glorious, and HDCP support means that the GD235HZ is suitable for 3D Blu-ray movies. But we were bummed that the monitor has just three video inputs (dual-link DVI, HDMI, and VGA), which limits the number of devices that can use this as a primary display. The lack of a USB hub is also frustrating, since that would be useful for the 3D Vision's IR emitter.

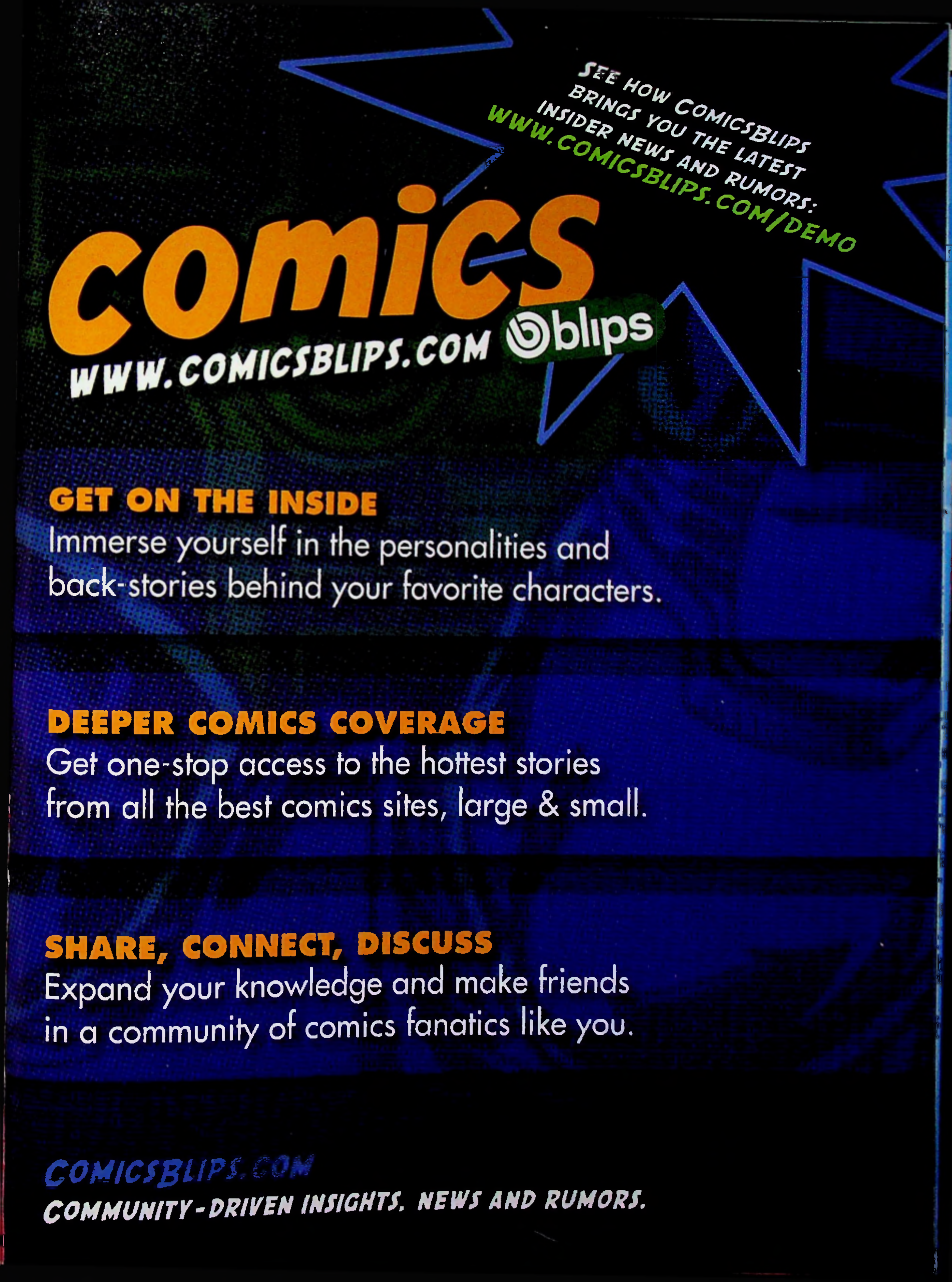
As it stands, the GD235HZ is the best monitor you can find for desktop 3D gaming or stereo 3D photographers. But it's still considerably more expensive than a 60Hz monitor of a comparable size, and it isn't even the best TN panel we've reviewed. We still think it's a product for early adopters, but at least the technology is moving in the right direction. **—NORMAN CHAN**

VERDICT 8

ACER GD235HZ

+ CAPTAIN ED	**− JAWS 3D**
1920x1080 resolution; fast response time; good contrast in both lights and darks.	Limited display inputs; no USB ports; some ghosting in 3D; restrictive stand.

$400, www.acer.com



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Gigabyte GA-P55A-UD6

SATA 6 and USB 3.0 come aboard—but at a price

Gigabyte's original GA-P55-UD6 (reviewed December 2009) held the distinction of not only being the first board we tested with Intel's LGA1156 socket, but also our preferred go-to board for months on end. It was only after Asus's beautiful Maximus III Formula showed up in our March issue that the GA-P55-UD6 was dethroned.

It didn't take Gigabyte long to fire a shot back, though, with its GA-P55A-UD6 board. At first glance, you'd think there was no difference between it and its predecessor. But up close, you can see slight changes to the board that make room for USB 3.0 and SATA 6 chips, as well as a slight repositioning of the PCB-mounted reset button. The most obvious physical change is the reduction in the number of inboard SATA ports. The GA-P55-UD6 had 10 ports whereas the GA-P55A-UD6 has eight. Both boards have two eSATA ports, compliments of a JMicron JMB362 part.

The reduction in SATA ports is likely due to the Marvell 88SE9128 SATA 6 controller's support of just two ports. The 88SE9128 supports both IDE and AHCI modes, as well as a two-drive array RAID 0 and RAID 1.

Our major concern with the GA-P55A-UD6 isn't really the fault of Gigabyte, but rather Intel. The P55 chipset doesn't come with enough PCI Express lanes for a true enthusiast platform. If you remember, with LGA1156, PCI-E is moved into the CPU. That gives you 16 PCI-E 2.0 lanes, which operate as either a single x16 for one GPU or as two x8 for two GPUs. The P55's PCH controller has another eight x1 PCI-E 2.0 lanes. However, according to Intel's data sheets, they operate at 2.5GT/s, not the 5GT/s we've come to expect of real PCI-E 2.0 ports. That didn't matter as much before USB 3.0 and SATA 6 came along, but a typical P55 board today will be starved for data.

For example, with two EVGA GeForce GTX 280 cards installed, the board's SATA controller maxed out 165MB/s in HDTach. When one of the GPUs was removed, the board gave us SATA 6 burst speeds of 283MB/s. Want more proof there's not enough PCI-E bandwidth? Manually setting the board's third PCI-E slot to x4 mode would disable the board's two other x1 PCI-E lanes. Sigh.

For those who don't intend to fully load up a rig with multiple GPUs, a P55-based GA-P55A-UD6 is a fine board. You get all the things we loved about the original plus USB 3.0 speed and SATA 6—and hell, it's still the only P55 board with six DIMM slots (although, you can't run double-sided DIMMs in all, so be aware.)

But if you really want to build up a system with enough hardware that you can barely move your PC, you should opt for an X58-based board, where there are enough PCI-E lanes to choke on. Because let's face it, when you're shelling out $250 on a board like the GA-P55A-UD6, it's going to be hard not to want a "real" board using X58 instead. —GORDON MAH UNG

BENCHMARKS

	Gigabyte GA-P55A-UD6	Asus Maximus III Formula
PCMark Vantage 64-bit Overall	9,120	**9,441**
Everest Ultimate 5.30.1900 Mem Read (MB/s)	**14,799**	13,351
Everest Ultimate 5.30.1900 Mem Write (MB/s)	11,143	**12,776**
Everest Ultimate 5.30.1900 Mem Copy (MB/s)	14,693	14,694
Everest Ultimate 5.30.1900 Mem Latency (ns)	52.5	53.1
SiSoft Sandra RAM Bandwidth (GB/s)	17.1	17.0
3DMark Vantage Overall	14,795	**15,002**
3DMark Vantage GPU	12,164	**12,203**
3DMark Vantage CPU	**48,816**	48,091
Valve Particle test (fps)	159	**161**
Resident Evil 5 low-res (fps)	**126.6**	120.4
World in Conflict low-res (fps)	253	**260**
World in Conflict (fps)	189	**230**

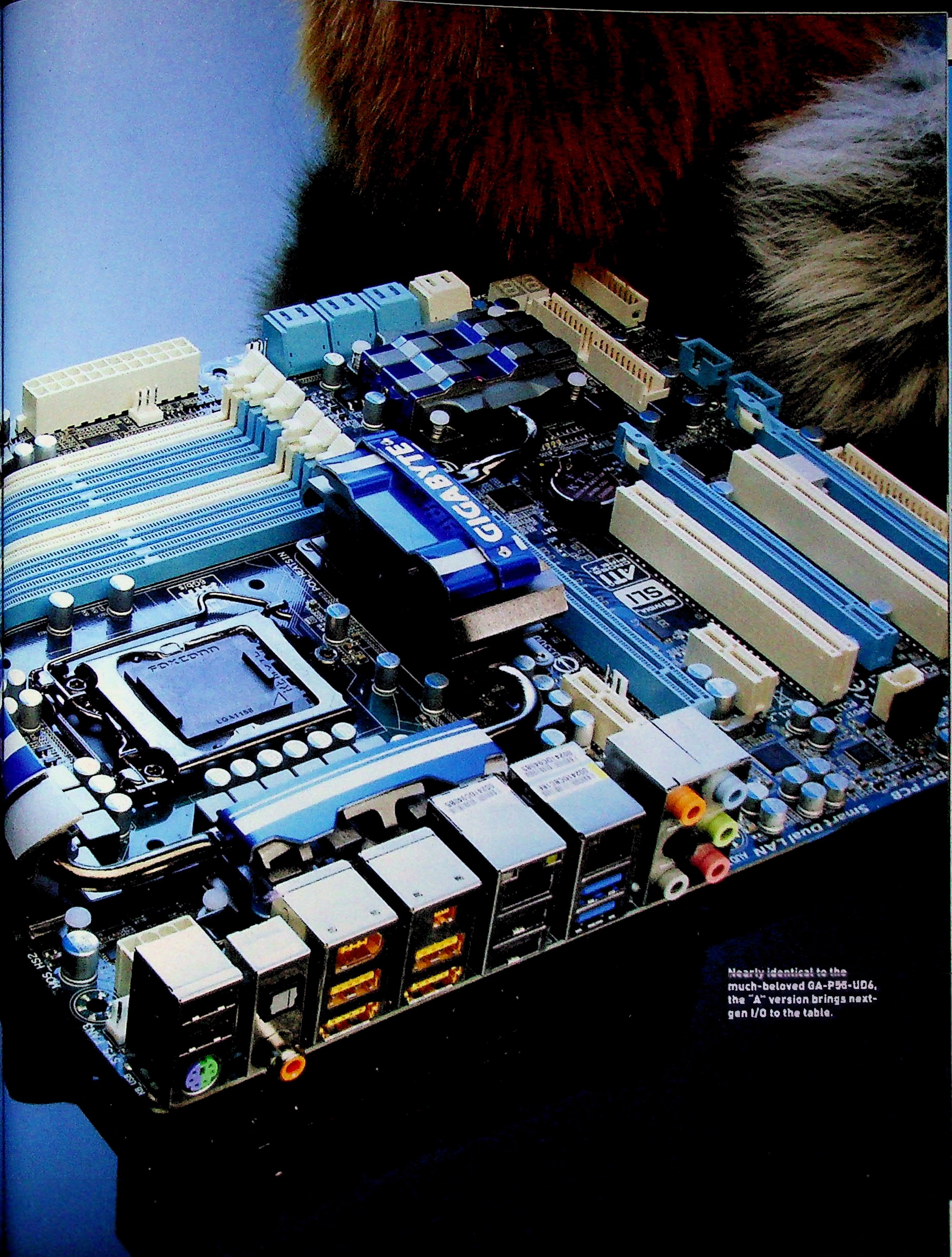
Best scores are bolded. For our tests we used a 2.93GHz Core i7-870, 8GB of Corsair DDR3/1333, a 150GB WD Raptor, an EVGA GeForce GTX 280, a PC Power and Cooling Turbo Cool 1200, and 64-bit Windows 7 Professional. For SATA 6 compliance, we used a Seagate Barracuda XT SATA 6 drive, and for USB 3.0 compliance, we used a Western Digital MyBook USB 3.0 drive.

VERDICT **7**

GIGABYTE GA-P55A-UD6

LOVE BITE	**DOG BITE**
USB 3.0 and SATA 6; packed with features.	Too few PCI-E lanes to support a fully loaded system.

$250, www.gigabyte.com.tw


GIGABYTE
SLI
ATI
FOXCONN
LGA1156
Smart Dual LAN

Nearly identical to the much-beloved GA-P55-UD6, the "A" version brings next-gen I/O to the table.

Toshiba NB305

The Pine Trail version of Toshiba's excellent vanilla netbook

The NB305's keyboard is its weakest point—it looks like the NB205's, but it's less crisp and the space bar doesn't always register hits.

Let's talk about love. When you love something, you love it for what it is, not what it isn't. We love netbooks; we don't care that they can't really do games, or HD Flash video, or any media encoding to speak of. We know what we want—all-day computing in a formfactor small enough to toss into a knapsack or messenger bag and barely know it's there, and cheap enough to be viable as a secondary PC. Toshiba's first netbook, the NB205, came out in the latter half of 2009, but was immediately lauded as a shining exemplar of netbook craft. So, can the NB305, its Atom N450–toting successor, replicate the NB205's success?

With the NB305, Toshiba has opted for a gentle refinement of the 205 rather than an all-out reimagining. Aside from the new Pine Trail N450 CPU and the Windows 7 Starter OS, the NB305 is virtually identical to its predecessor. Both share standard netbook specs: 1GB DDR2 RAM, a 250GB 5,400rpm hard drive, and a 10.1-inch 1024x600 screen. And the 305 replicates the NB205's styling almost identically, from the matte-silver plastic chassis, textured lid, and matching bezel to the striped touch pad and chiclet keyboard.

Two of our favorite features from the NB205 carry over into the sequel: hard drive vibration detection and plug-and-charge USB. One improvement: Thanks to the N450's lower energy requirements and refinements by Toshiba, the NB305's 6-cell battery doesn't protrude from the back of the chassis like its predecessor's did. The chassis is a bit slimmer, too, and the ports have been shifted slightly—the SD card reader is on the left, instead of the front, and the audio jacks are on the right.

The NB305's keyboard, while fairly roomy, is less crisp than the 205's. We found keystrokes wouldn't always register the way we expected them to—the space bar in particular isn't as sensitive as we would like and didn't always pick up on our hits.

Pine Trail's power efficiency is what drives the NB305's truly excellent battery life. In our full-screen DVD-quality video-playback test, running at 50 percent screen brightness and 50 percent volume, the NB305 lasted more than seven and a half hours, 79 percent longer than our zero-point and fully half an hour more than the next best netbook we've tested. In the rest of our benchmarks, the NB305's numbers were a little more down to earth, with performance ranging from 3 percent slower than our zero-point (in Quake III) to 14 percent faster (a still-unplayable 4.1fps in Quake 4).

As a vanilla netbook—one without Nvidia's Ion netbook gaming platform—the NB305 performs well. It ships in two configurations: a $350 version with Windows XP, a smaller hard drive, and no sleep-and-charge USB port, or the $400 Windows 7 Starter version reviewed here. You'll have to decide for yourself, though, whether an added half-hour of battery life and a sleep-and-charge port are worth the $100 premium you'll pay over the Acer Aspire One AO532h (reviewed April 2010)—especially given the NB305's wonky keyboard and lack of Bluetooth. **—NATHAN EDWARDS**

SPECIFICATIONS

Processor	1.66GHz Intel Atom N450
Chipset	Intel NM10 Express
Graphics	Intel GMA 3150
Display	10.1-inch LED-backlit TFT LCD@1024x600
RAM	1GB DDR2/667
Storage	250GB HDD (5,400rpm)
Ports	Three USB 2.0, audio in/out, SD reader, VGA, 10/100 Ethernet Wireless: 802.11b/g/n
Lap/Carry	2 lbs, 14.4 oz / 3lbs, 7.6 oz

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3 (sec)	708	667.0
Main Concept (min)	251	246.0
Quake 3 (fps)	60.9	58.9 (-3.3%)
Quake 4 (fps)	3.6	4.1
Battery Life (min)	265	457.0

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point netbook is a Lenovo IdeaPad S12 with a 1.6GHz Intel Atom N270, 1GB of DDR2/667 RAM, a 160GB hard drive, Intel GMA950 integrated graphics chipset, and Windows XP Home SP3.

VERDICT **7**

TOSHIBA NB305

+ NOTA BENE

Incremental improvements to solid platform; great battery life; sleep-and-charge USB port.

– NIHIL NOVI

Win 7 Starter; no Bluetooth; wonky keyboard (especially space bar); expensive.

$400, www.toshiba.com

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Netgear Rangemax WNDR3700

Meet our new favorite wireless router

As many readers have pointed out, it's long past time for us to pick a new Wi-Fi router for our Best of the Best list (the previous title holder, Linksys's WRT600N, having disappeared off store shelves several months ago). Folks, we have a winner: Netgear's Rangemax WNDR3700 is packed with features and it performs like a thoroughbred.

First, let's discuss features. This is a dual-band 802.11n router, which means it's outfitted with two radios—one that operates on the 2.4GHz frequency band and a second that operates on the less-crowded 5.0GHz band—so you can operate two wireless networks simultaneously. Most people will use the former for data traffic and the latter for media streaming (especially since the 5.0GHz radio has a video quality-of-service feature designed to reduce packet loss and jitter that's not found on the 2.4GHz radio).

You can also operate guest networks on each radio (each with its own SSID and security mode), which allows you to grant visitors Internet access while your data network remains safely isolated. And if you're looking for a new wireless router for your small business, the WNDR3700 supports WPA/WPA2 Enterprise encryption in addition to the more typical WEP and WPA/WPA2 pre-shared key. Wi-Fi Protected Setup is also supported, so you have no excuse for not protecting your network with a complex password. As is common of routers in this class, the WNDR3700 is equipped with a four-port gigabit Ethernet switch.

Plugging a hard drive into the USB 2.0 port adds NAS-like functionality to the router, with support for drives formatted with FAT16/32, NTFS, or Ext2/3 file systems. A built-in DLNA media server enables you to stream music, video, and digital photos to remote clients, including gaming consoles like the Xbox 360 and network-enabled A/V receivers. You can access USB storage over the Internet using either HTTP (uploads only) or FTP (uploads and downloads). The USB port cannot, however, be used to share a printer over the network.

The absence of a switch or firmware setting that can turn off the WNDR3700's router feature to convert it into a wireless access point is unusual, especially since each of its radios can be reconfigured to operate as a wireless repeater or bridge (using the WDS—Wireless Distribution System—standard). You can also tweak each of the radios' transmission power settings, in case the router stomps on your neighbors' Wi-Fi networks. Activate the router's parental-controls feature and the device will automatically block access to sites that the folks at Netgear-partner OpenDNS consider "objectionable." We've never been fans of this type of technology, but to each his own.

In our performance benchmarks, the WNDR3700 placed a distant second to the now-discontinued WRT600N at close range, delivering TCP/IP throughput of 85.9Mb/s compared to the Linksys's 116Mb/s in our kitchen test, and 48.4Mb/s with the client on the patio compared to the Linksys's 86Mb/s. But the Netgear walloped the Linksys when the client was placed in the bedroom (63.9Mb/s vs. 26.7Mb/s) and in our two outdoor spots (delivering TCP/IP throughput of 22.7Mb/s and 5Mb/s, respectively, compared to just 0.2Mb/s and 0.4Mb/s).

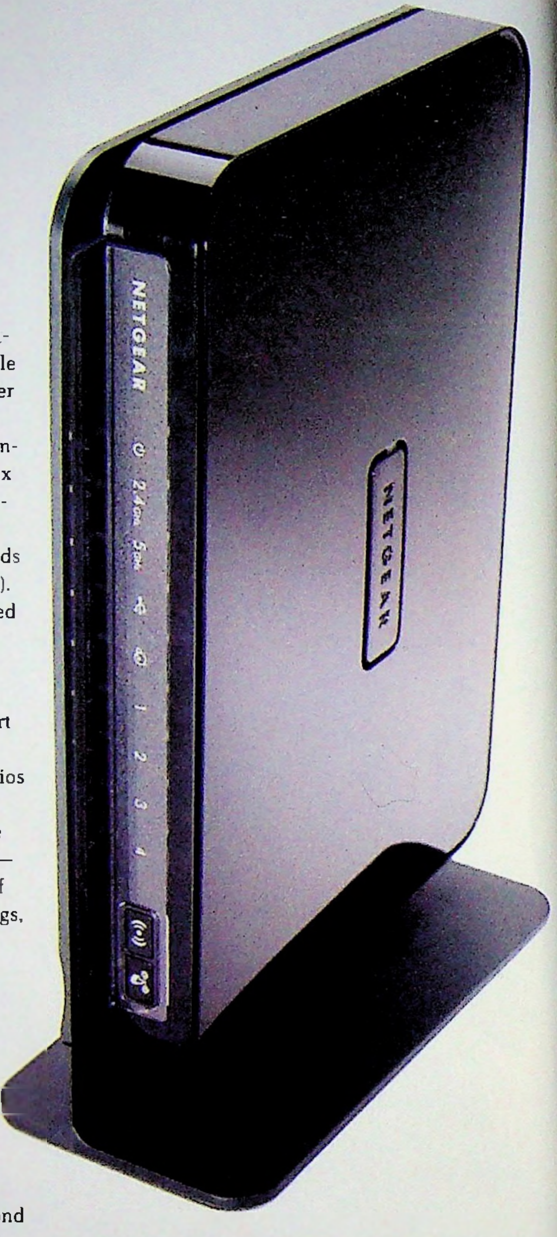
If you don't need dual-band, Buffalo's WZR-HP-G300NH is a better value, especially at long range; but if you're looking for a router with almost everything, Netgear's WNDR3700 is the one to buy.

—MICHAEL BROWN

BENCHMARKS

	Netgear WNDR3700	Linksys WRT600N
Kitchen, 20 feet (Mb/s)	85.9	**116.0**
Enclosed Patio, 38 feet (Mb/s)	48.4	**86.0**
Media Room, 35 feet (Mb/s)	**63.9**	26.7
Bedroom, 60 feet (Mb/s)	**26.8**	21.5
Outdoors 1, 90 feet (Mb/s)	**22.7**	0.2
Outdoors 2, 85 feet (Mb/s)	**5.0**	0.4

Best scores are bolded. TCP throughput measured using IPerf. N/C indicates no connection at that location. Read more about our testing methodology at http://bit.ly/16w270.



Netgear's WNDR3700 can operate horizontally or vertically (using the provided stand), or you can mount it to a wall.

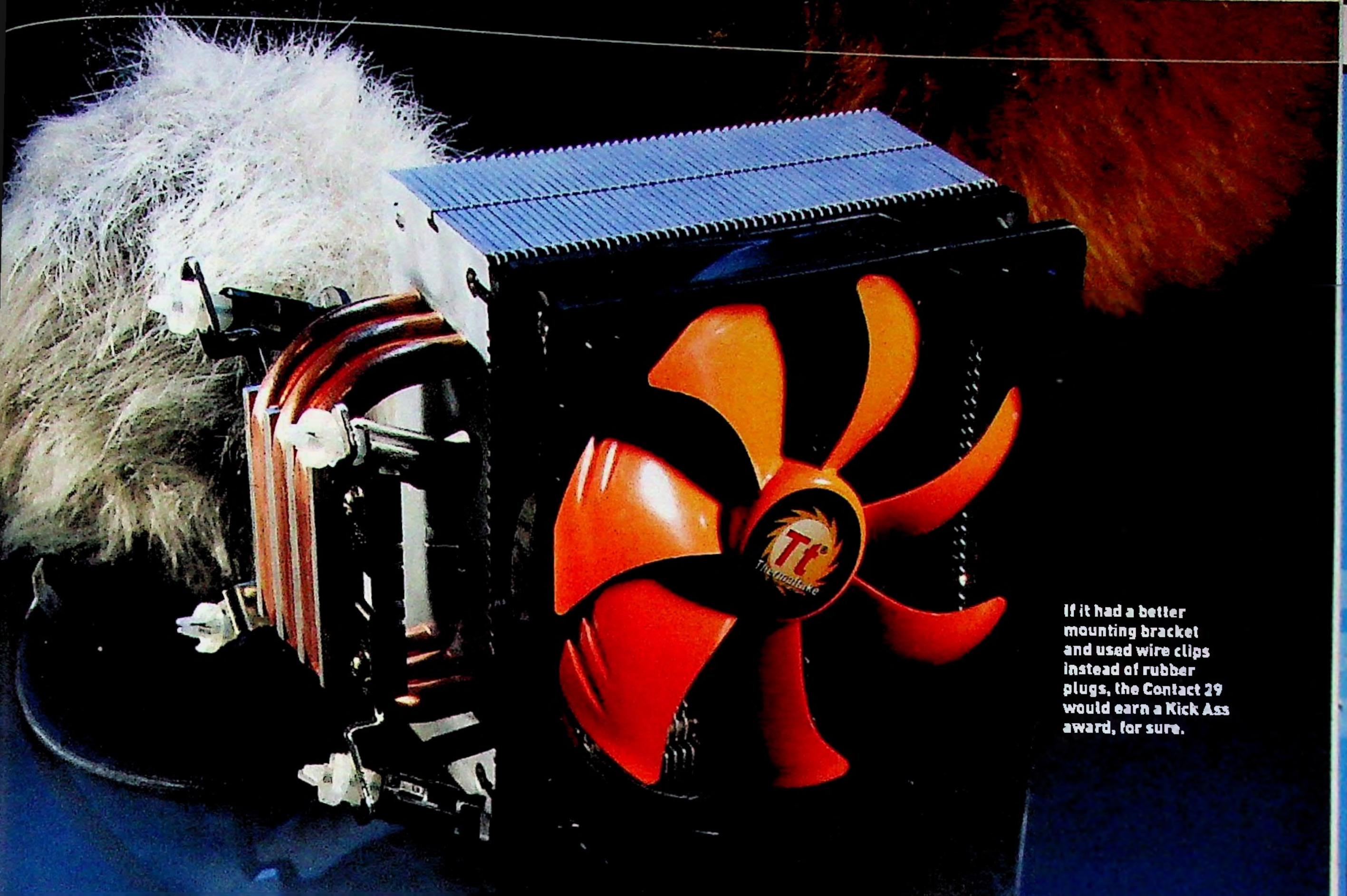
MAXIMUMPC KICK ASS!

VERDICT 9

NETGEAR RANGEMAX WNDR3700

➕ DISRAELI GEARS	➖ JAMMED GEARS
Dual 2.4GHz/5.0GHZ radios; guest networks; DLNA media server; very good range; USB drive sharing.	Can't share a USB printer over the network; no BitTorrent client.

$190, www.netgear.com



If it had a better mounting bracket and used wire clips instead of rubber plugs, the Contact 29 would earn a Kick Ass award, for sure.

Thermaltake Contac 29

Direct-contact heat pipes must work!

When the wimpy-looking Cooler Master Hyper 212+ (reviewed Holiday 2009) came along and matched performance with the best air coolers on the market, we wondered if its direct-contact heat pipes were responsible, and if so, how soon we'd start seeing imitators. It didn't take long. Thermaltake's Contac 29 is a near-carbon copy of that little wonder, with a few subtle refinements and one colossal pain.

Like the Hyper 212+, the Contac 29 features three heat pipes that run from a heat exchanger up through a stack of thin aluminum fins, paired with a single 12cm fan (as well as room for another, if you want to push/pull air). Differing from most skyscraper-type coolers, the heat pipes on the Hyper and Contac contact the CPU heat spreader directly, instead of being embedded in a blocky heat-exchanger. The direct-contact method seems effective; in our tests, the Contac 29 matched the Hyper 212+'s performance to within one degree Celsius at full burn, and performed identically when idling.

The Contac 29, though very similar to the Hyper 212+, has its unique quirks. Unlike the Hyper's mounting system, with its backplates, bolts, and screws, the Contac 29 uses the same plastic push pins as Intel's stock coolers. This makes installation easy, or it should—we prefer sturdier mounting brackets, though. The last few millimeters of the fins are bent 90 degrees to direct airflow and prevent leakage at the sides.

Instead of wire clips to hold the cooling fans, the Contac 29 uses rubber plugs that slide through channels in the cooling fins and secure the fan loosely. These plugs were the source of most of our frustrations with the Contac—they're hard to remove and harder to put back, which is a deal-breaker when you have to remove the fan to install the darn thing. We much prefer the simpler wire-clip method. Thermaltake at least includes a second set of these plugs, if you want to add an additional fan.

With cooling power, footprint, and price commensurate to the Hyper 212+, the Contac 29 is a damn-fine cooler. But we'll stick with the Hyper 212+'s more-secure installation and better fan-retention mechanism, thank you. –NATHAN EDWARDS

BENCHMARKS

	Thermaltake Contac 29	CoolerMaster Hyper 212+	Stock Cooler
Idle (C)	30.25	30.25	35
100% Burn (C)	45.75	45	62.5

Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour's worth of CPU Burn-In (four instances). Test system consists of a stock-clock Q6700 processor on an EVGA 680i motherboard inside a Corsair 800D case with stock fans.

VERDICT **9**

THERMALTAKE CONTAC 29

+ CONTACT	– STAR TREK: FIRST CONTACT
Top-tier performance; similar price/size as CM Hyper 212+.	Tetchy push-pin install; frustrating fan attachments.

$30, www.thermaltakeusa.com

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Vantec NexStar 3 SuperSpeed

This USB 3.0 chassis will slash your backup times

The NexStar 3 SuperSpeed can't keep up with an SSD's SATA speeds, but it does well with mechanical hard drives.

External hard drive enclosures are great if you have to move large amounts of data around frequently or easily add storage to a packed desktop system.

With USB 2.0, though, transfers have always been capped at 33MB/s at best, making huge data backups a real snooze-fest. On the plus side, this meant your primary disk's transfer speed didn't matter at all—any reads and writes were limited by USB 2.0's bandwidth limit. Those days will be drawing to a close as USB 3.0 takes hold. We've already tested one USB 3.0 external hard drive: the WD My Book 3.0 (reviewed April 2009). That was a fine product, but what if you already have a high-capacity backup drive and you just want to speed up your transfer times?

In that case, you may want to peep Vantec's NexStar 3 SuperSpeed hard drive enclosure. As its name implies, it's USB 3.0 compliant. Like its predecessors, the NexStar 3 is an aluminum enclosure featuring an on/off switch, power/drive activity LED, power cable, and USB port. It includes a stand for stable vertical storage and little rubber feet on one side so it can sit horizontally. The faceplate of the enclosure is attached to the drive tray. Both the faceplate and drive tray slide out of the case to allow a 3.5-inch drive to be slotted onto the SATA connector and then secured to the tray with four screws. Indeed, the only way the NexStar 3 SuperSpeed differs from its kin is that it includes USB 3.0 instead of just 2.0.

We tested the NexStar 3 SuperSpeed with two drives: the 128GB Kingston SSDNow V+ (reviewed on page 75), and a 1.5TB Seagate Barracuda 7200.11, a speedy last-gen mechanical hard drive. We used the NEC PCI-E to USB 3.0 controller that shipped with the WD My Book 3.0.

We compared the results against those of both drives connected directly to the motherboard using a SATA cable.

Transfer speeds from the NexStar 3 were much lower than the theoretical throughput of 5Gb/s listed on the box. In fact, both drives had lower transfer speeds via USB 3.0 than they did via SATA, with the biggest slowdowns coming from the Kingston drive. The drive's reads bumped up against 180MB/s using SATA but barely reached 111MB/s when connected with the NexStar. The Barracuda went from 103.3MB/s reads and 102MB/s writes using SATA to 91.2MB/s reads and 82.9MB/s writes on the NexStar. Burst speeds suffered on both drives, too—the Barracuda's near-200MB/s bursts dropped to just over 100MB/s, while the Kingston went from 224MB/s to just 117MB/s.

It's worth noting that both drives outperformed the My Book 3.0, with its 1TB Caviar drive, and both roughly tripled USB 2.0's best speeds. It's probably too early in USB 3.0's lifespan to expect performance anywhere near the theoretical maximum, of course. This version of the NexStar is designed for 3.5-inch mechanical hard drives; it's possible that Vantec's upcoming 2.5-inch version will be better. Still, for now, getting near-internal speeds from your external mechanical drive is nothing to sneeze at.

As an external hard drive enclosure, the Vantec NexStar 3 SuperSpeed succeeds—if your rig is USB 3.0 capable. It's nice to be able to throw your backup drive into a speedy external chassis and triple your transfer speeds. It won't match speeds with a drive connected directly to your rig, but if you need a better chassis for your backup drive, this is it. And swapping in a different drive takes only a few minutes. We wouldn't put an SSD in this enclosure for longer than it takes to clone a drive; but you'd have to be crazy to use SSDs for external storage, anyway. **—NATHAN EDWARDS**

BENCHMARKS

	Kingston SSDNow V+ (Vantex on USB 3.0)	Kingston SSDNow V+(SATA)	Seagate Barracuda 7200.11 (Vantec on USB 3.0)	Seagate Barracuda 7200.11 (SATA)
Capacity	128GB	128GB	1.5TB	1.5TB
HDTach Avg. Read (MB/s)	111.4	**180.1**	91.2	103.3
HDTach Avg. Write (MB/s)	97.1	**168.0**	82.9	**102.1**
HDTach Burst (MB/s)	117.6	**223.9**	109.6	**196.1**
HDTach CPU Utilization	5%	**4%**	5%	8%
HDTach Random Access (ms)	3	.3	16.0	15.7

Best scores are bolded. HD Tach version 3.0.1.0 used. Tested on our hard drive test bench: an Asus P7P55D Premium running an Intel Core i5-750 @2.67GHz with 64-bit Windows 7 Professional.

VERDICT **8**

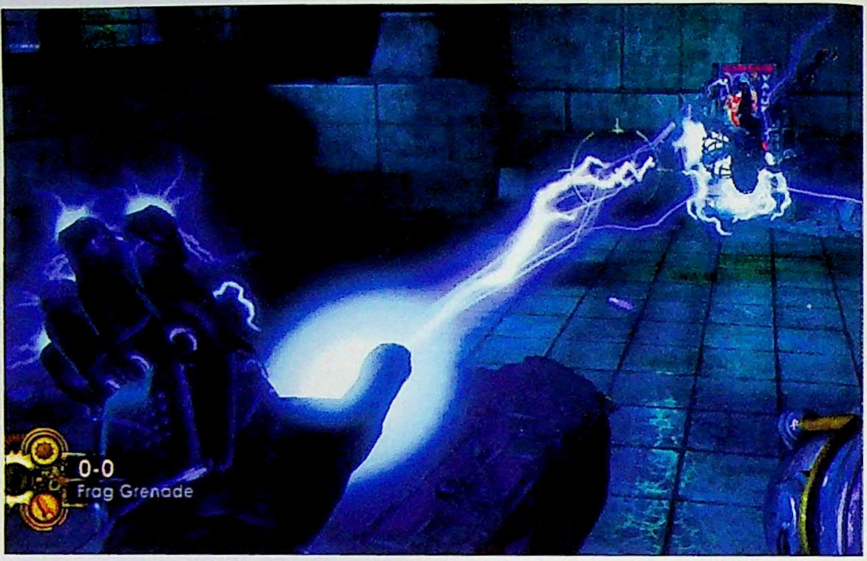
VANTEC NEXSTAR 3 SUPERSPEED

+ VANGUARD	**– VAGABOND**
Well-constructed, good-looking chassis; quiet.	Performance nowhere near USB 3.0's theoretical maximum.

$35, www.vantecusa.com

BioShock 2

Not as shocking as the first game, but still a worthy sequel



BioShock. *Geddit?*

The first BioShock managed quite a feat: It was that rare game that both opened and closed the book on a strange, new environment. For the most part, it left very few questions unanswered, and despite its flaws, the general consensus was that gamers' first go-round on the bathysphere should also have been their last. For all intents and purposes, the game was a complete experience that didn't need a sequel. But it got one, anyway.

And yet, for all the talk of BioShock 2 being nothing more than a quick cash-grab, the game is actually quite good—great, even. But is it a worthy successor to a modern classic? Yes, surprisingly enough.

BioShock 2 stuffs you into the hulking diving suit of the first Big Daddy—roughly 40 percent of which is composed of a gigantic, face-perforating drill. Yeah, you're not just some wimpy, fish-out-of-water human this time around. And the changes don't end there. Rapture's been overtaken by a veritable army of little-girl-kidnapping Big Sisters, and it's up to you to put a stop to their maniacal plan. What follows, then, is a whirlwind adventure of drilling, Splicer shooting, Adam-harvesting, and more drilling.

And it's tons of fun. The brand-new ability to simultaneously wield both weapons and all manner of fire-spewing, tornado-conjuring, baddie-blasting plasmid powers adds a new layer of strategy to the series' chaotic battles. Good thing, too, because the game's genetically mutated enemies—known as Splicers—have only gotten bigger and nastier during the 10 years that have elapsed in Rapture time.

But off-the-wall, super-powered combat is only half the BioShock equation. The other half—the story—is where BioShock 2 doesn't quite reach the lofty heights occupied by its predecessor. Here's the thing, though: By normal standards, BioShock 2's story is pretty great. Fantastic, even. And, fret not, philosophy majors, because many of the game's themes are even more interesting than BioShock's. Execution, however, is another story. Whereas BioShock was full of memorable set pieces and moments, BioShock 2's tend to run together—up until the last couple of hours, which, without spoiling anything, are amazing.

In some cases, this is actually a good thing, as BioShock 2 is much more consistent than its predecessor. Sure, it rarely reaches the heights of the first game's early sequences, but neither does it ever plunge to the depths of the first game's sub-par ending.

BioShock 2's multiplayer, meanwhile, is a pleasant surprise. It's injected with just enough of BioShock's atmosphere and personality to keep things fresh, yet it's traditional enough to remain accessible. Plasmid powers are the main draw, of course, but the possibility of one player assuming control of a Big Daddy during the match ensures that things never grow dull. Really, our only problem with the multiplayer stems from its use of a Modern Warfare–like unlock system. For weapons, that's fine, but BioShock 2 forces you to unlock many of its coolest powers, which means the multiplayer doesn't truly shine until you've played it for many hours.

We're pretty sure he needs first aid more than we do.

Ultimately, though, our complaints are minor. BioShock 2 actually manages to surpass its predecessor in a number of ways and—in our book—is simply more fun to play. Sure, déjà vu might creep up on you every once in a while, but you'll probably be too busy drilling a hole in its face to care. **—NATHAN GRAYSON**

VERDICT **9**

BIOSHOCK 2

✚ **WOULD YOU KINDLY?**	▬ **NO, I'D RATHER NOT**
Combat balances tactics and outright chaos; excellent level design; surprisingly enjoyable multiplayer.	Set pieces not as engaging as BioShock's; multiplayer unlock system initially bars players from its main draw.

$49, www.bioshock2.com, ESRB: M

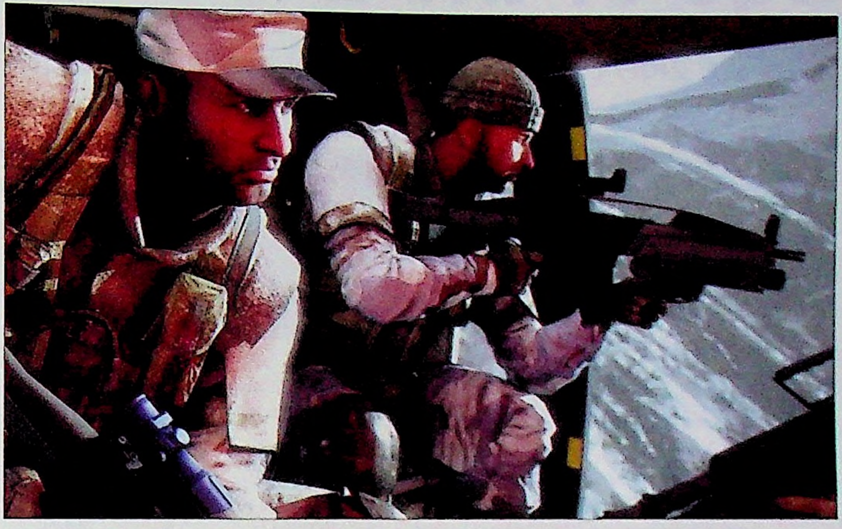
Battlefield: Bad Company 2

Just don't call it Battlefield 3

We hold the Battlefield franchise close to our hearts—Battlefield 1942 revolutionized online warfare, and Battlefield 2 is one of the best multiplayer shooters of all time. But the series hasn't fostered another winner in recent memory. That's why we were a little apprehensive about playing the newest Battlefield game, Bad Company 2 (a sequel to a console-only spin-off title). But despite fears that this was just going to be a knockoff of Activision's Modern Warfare 2, Bad Company 2 stands on its own as a refined Battlefield experience that's worthy of its pedigree.

In fact, Bad Company 2 prides itself in being different from Modern Warfare 2, something it goes out of its way to point out in the 13-mission single-player campaign. That's right—this is the first PC Battlefield game with a story. The Bad Company in the game's name refers to you and your squad of four misfit soldiers, sent across snowy mountains and humid jungles in search of a stolen Japanese superweapon.

This fanciful MacGuffin serves to drop you and your AI-controlled squadmates into firefights where the game can show off its big technical achievement: destructible environments. Entire buildings can crumble to ruins under the force of grenades or tank shells, making the safety of cover feel very ephemeral during the frequent firefights. We could be sniping enemies from the window of a house and a second later that entire side of the house might be blown away. Alternatively, we also found that we could blow holes in walls to escape from deadly situations, too.


A three-dimensional battlefield is recreated through Battlefield's always-excellent vehicle integration, such as this helicopter insertion into a hot landing zone.

But aside from this novel use of environment and cover, there's not much else to Bad Company 2's campaign that sets it apart from other shooters. Extremely linear map design, an overabundance of rail-shooter segments, and generically incompetent enemies make the game feel like a dated console port. We had the impression that the developers were so intent on showcasing level destruction in the action scenes that they didn't have time to develop any other innovations.

It's also peculiar that the single-player campaign doesn't train you for the multiplayer game, which is where Bad Company 2 really shines. This is pure Battlefield—16-vs.-16 matches that emphasize teamwork, tactics, and solider-class specialization. The Rush mode, for example, sends a team of attackers to destroy a series of targets, each successful assault opening the map to additional objectives. Squad Deathmatch is another uniquely fun mode that pits four teams against each other in a free-for-all.

Armed UAVs make a deadly reappearance in Bad Company 2.

In each gameplay type, we found that the best teams were the ones that effectively used the squad system, sending Engineers in the lead with vehicles, Assault-class soldiers around buildings to flank, and Recon snipers to safe vantage points to spot enemies. The lone-wolf mentality won't take you far. In this regard, the game doesn't differ much from previous Battlefield games, but it's nonetheless great fun.

Bad Company 2 plays like an evolutionary step in the series, taking what we loved about Battlefield 2 and streamlining it in a game that appeals to both PC and console gamers. We just wish the developers dropped the solo campaign entirely to bring some real innovation to the multiplayer game. But for that, we'll just have to wait for Battlefield 3. **—NORMAN CHAN**

VERDICT **8**

BATTLEFIELD: BAD COMPANY 2

➕ **OMEGLE**	➖ **CHATROULETTE**
Brilliant multiplayer game modes; balanced soldier kits; destructible environments.	Uninspired single-player, slow multiplayer-server browser; check-point save games.

$50, www.battlefieldbadcompany2.com, ESRB: M

LAB NOTES

Eye of the Beholder

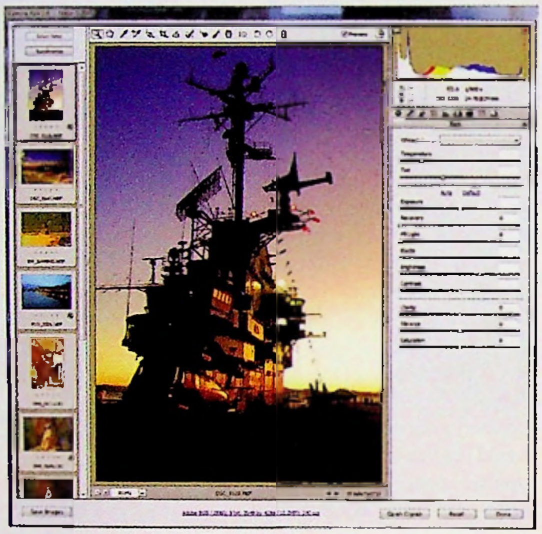
Why we didn't test image quality in our roundup of raw photo editors

LOYD CASE
CONTRIBUTING EDITOR

Raw image editors work with digital images in the same way sculptors start with bare stone or metal. The final product is utterly unlike the initial raw material. So, when I was looking at how the five different raw file editors handled batch conversions, I threw out the idea of examining the image quality of the final JPEGs.

Each batch converter handles the conversion process differently. Adobe Camera Raw allows you to easily alter every parameter, while Nikon's Capture NX2's batch process is bare-bones. Just doing default batch conversions then pixel-peeping at the JPEG results wouldn't have revealed anything about the final image quality.

It's the tools themselves, their robust features—or lack thereof—for altering the raw image that generates the final photograph. Each gives you a different path to photographic creativity. Format conversions are just the end of the pipeline.



GORDON MAH UNG
SENIOR EDITOR

I've seen all kinds of weirdness in our Lab, but I recently booted a mobo with the RAM not fully seated that would report the correct amount of RAM but would only run in single-channel mode. It would even run Windows and benchmarks. Only after reseating the RAM did the board finally boot in dual-channel mode.

MICHAEL BROWN
REVIEWS EDITOR

My view that HDCP is mature enough now that new products shouldn't have problems with it might be optimistic: PowerDVD 9 is refusing to send encrypted Blu-ray video from my home-theater rig to a new Rocketfish wireless HDMI adapter I'm testing. The adapter works fine with a stand-alone Blu-ray player. I'll have more details in my review in the June issue.

NATHAN EDWARDS
SENIOR ASSOCIATE EDITOR

I've been neck-deep in mid-tower chassis—I keep wanting to pluralize it to "chasses." I have a perfectly good rig at home built into the Cooler Master Storm Sniper case, but now I want to upgrade to the Fortress 2 or the NZXT Hades. Bad, Nathan. I also made an SSD bracket out of cardboard in lieu of an actual mounting bracket.

ALEX CASTLE
ASSOCIATE ONLINE EDITOR

This month has been an amazing month for strategy gamers, with Napoleon: Total War, Supreme Commander 2, Command and Conquer 4, and the StarCraft 2 beta all coming out within a matter of weeks. I'm excited about all these games, but I wish they'd been spaced out better—there's not enough time to play them all!

KATHERINE STEVENSON
DEPUTY EDITOR

Despite my pestering, Dell says it can't get me its new highly portable 11.6-inch Alienware M11x gaming notebook in time for next month's issue. So instead I'll be swinging to the other extreme and hoisting AVADirect's new X8100 onto my Lab bench. Does an 18.4-inch Core i7 rig with two GTX 285M cards in SLI even qualify as a notebook?

VISIT

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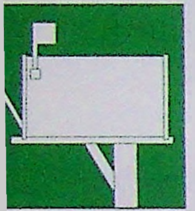


Speed up Win7

I'm trying to improve the startup speed of my PC and wanted to know how you use Windows 7's built-in performance tool to measure it ("In Search of the Sub-30 Second Boot," March 2010)?

—Devin Shanks

Senior Editor Gordon Mah Ung Responds: It's pretty easy. Click the Start button and search for Event Viewer. Launch Event Viewer and then drill down into Applications and Services Logs > Microsoft > Windows > Diagnostics-Performance, and then click Operational. In the Task Category column, look for Boot Performance Monitoring and select it. Boot Duration indicates how long it took the system to boot in milliseconds.

Norman Chan: Environmental Scofflaw?

Love your commentary and tips, but I want to take issue with Norman Chan's March 2010 How To section comment that energy savings "be damned," which I'm sure he didn't mean literally. As an energy and foreign policy strategist, as well as hardcore gamer with a screamer rig, I would argue that the power user community should always be advocating for saving energy in our energy-hungry machines. That means demanding innovation from manufacturers (efficient power supplies, etc.), better coding from devs, and, yes, good energy-consuming habits from users!

—Chris Ajemian

Editorial Director Jon Phillips Responds: Chris, as you suspected, Norm was being facetious when he damned energy savings in favor of running his PC nonstop. Also, keep in mind that the *Maximum PC* offices are located in the San Francisco Bay Area, where we face a steady barrage of scornful finger-wagging: Compost your food waste. Don't burn firewood. If it's yellow, let it mellow. Sometimes a guy just wants to defy the killjoys and let his machine run freely—like a wild stallion. And of course, we use our idle CPU cycles to help our Folding@home team crunch numbers for medical research. The *Maximum PC* team (ID: 11108) currently ranks third on the Folding@home scoring chart!

The Game That Won't Die Award

Having read your gaming awards article (March 2010), I thought Torchlight sounded interesting, so I downloaded the demo. After about five seconds, I realized I was playing the game Fate, from WildTangent. It isn't just similar, it is exactly the same game with newer graphics. I like Fate and have played it on and off for years, but I

CUTCOPYPASTE

▸ In our review of the HIS Radeon HD 5970 (March 2010), we posted the wrong benchmark chart. The correct benchmark scores can be found here: http://bit.ly/aHpAuA.

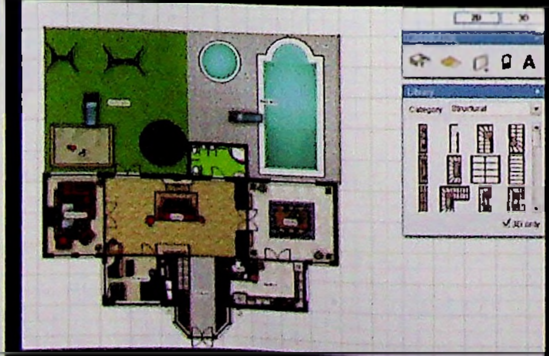
▸ In our How To guide to water-cooling (April 2010), we mistakenly referred to the Corsair Obsidian 800D as the Cooler Master 800D.

NOW ONLINE

30 Useful (and Unknown) Web Apps

We hate to say it, but hardware is becoming less important with each passing day, as more and more software moves onto the Internet. We're not looking forward to the day that our PCs become Chrome OS–style thin clients, but we have to admit, some web apps are pretty awesome.

To help you prepare for a future in the cloud, we've put together a list of 30 of our favorite web apps and services. We've tried to keep them on the lesser-known side, but a few of the classics snuck their way in: http://bit.ly/bkBb2H.



don't see how anyone can give an award to a game that has been around for so long, unless it's the Game That Won't Die Award.

—John Kirk

Senior Associate Editor Nathan Edwards Responds: John, Torchlight is Fate in the same sense that Torchlight is Mythos or Fate is Diablo—they're all action-RPGs, games in a genre that might as well be called "Diablo clones." They all share similar gameplay, and similar characteristics, and often the same creators. Torchlight developer, Runic Games, consists of Fate designer Travis Baldree, as well as Erich and Max Schaefer, who designed the first two Diablo games. And, of course, the entire Mythos team.

Torchlight is very similar to Fate, of course—just look at the fishing and pet mechanics—but it's not absolutely identical. Fate doesn't really have character classes or talent trees. But that's not really important. Torchlight is a polished game that fills a very important role in our hearts, and not just because we need something to play while we wait for Diablo III. Torchlight has a robust editor, with plenty of user-created dungeons and mods available. And it *does* have a different story than Fate, if you're into story. If you're just into action-RPG click-fests and loot-grinding, well, Torchlight's still a great game. And hey, the MMO version of Torchlight comes out in a year or so, and Fate didn't have one of those, did it?

Keep It Clean, Please

I love your magazine. I have every issue since 2006, and really value the opinions from every editor. I do have one small complaint, though. I listen to your podcasts while working from home sometimes and... well, I have small children that like to play in my office and the expletives are progressively getting stronger and more frequent. I also have customers walking into my storefront and it is not something I want them to have to listen to while using my services. Now, I am not at all the person to preach or even sound like a saint, so I hate to even ask. The issue is that as a professional organization, this language is very uncalled for and you probably have more fans than you think who would love to listen to your podcasts but have children or customers in or nearby to contend with. You can do as you wish, but I cannot continue to listen, though I would really like to.

—Mark Cheshier

Senior Editor Gordon Mah Ung Responds: Your letter reminds me of the scene in *The Big Lebowski* when Sam Elliott sits next to The Dude and tells him he likes his style, "but do you have to use so many cuss words?" Be that as it may, we do label the podcast on iTunes as "explicit" to warn people that it's not safe for work or children. We attempted to have cuss-free podcasts in the past, but that didn't get very far. Instead, I'm thinking we could implement a system similar to President Carter's response to the gas embargo. Thus, we would cuss only every other podcast, letting the pro-cuss people listen to the cuss versions (with extra cuss) and the anti-cuss people listen to the cleaned-up version. (To see if I'm serious, look for the Maximum PC No BS Podcast on iTunes.)

Why No 'Best' PSU?

How about adding a power supply category to the Best of the Best section?

—Michael Decker

Senior Editor Gordon Mah Ung Responds: Michael, we've long resisted adding a power supply to our Best of the Best list because it's not a component we regularly review. In the past, when we ran power supply roundups we used the old standby strategy of building a system, loading it up with hardware, and then cranking the room's thermostat to 99 degrees. Things have gotten a lot more sophisticated, though. Reviewing a power supply today could require the use of a temperature-controlled electronics oven to properly "bake" it, and nothing short of extremely expensive test equipment, some of which runs up into the six-figure range—a tall order in this economy.

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NEXT MONTH

COMING IN

MAXIMUM PC's

STILL IN 2D AND PROUD OF IT

JUNE

ISSUE

WIN7 TIPS: THE HARDCORE EDITION

Looking for vanilla OS tips? You won't find them next month. Our editors share only their most coveted, secret, devastatingly cool Win7 hacks.

SSD SHOWDOWN

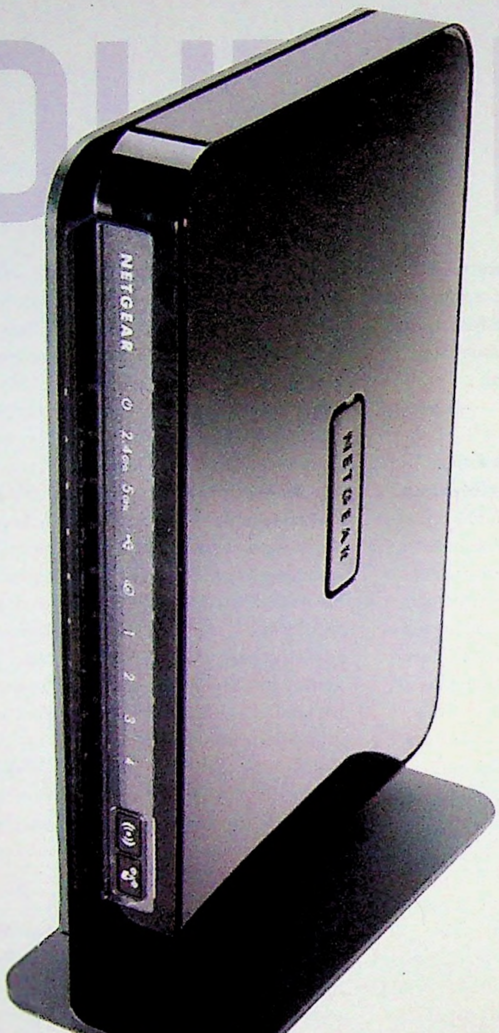
Armed with larger capacities and full Windows 7 support, how do the latest solid-state screamers perform in our gauntlet of storage benchmarks?

BATTLE OF THE BUDGET CPUs

Gordon Mah Ung pits Intel's Core i3-530 against AMD's Athlon II X4 630. Even with their prices combined, that's just $213 of CPU! A winner crowned, a loser humiliated.

WI-FI ROUTER

Netgear Rangemax WNDR3700



Netgear's Rangemax WNDR3700 dual-band wireless router isn't as fast at close range as our previous fave—Linksys's WRT600N—but it delivers far better range and a stronger feature set than any router we've tested to date.

The WNDR3700 has all the standard high-end features, and then some: You can run an independent guest network on each radio, there's a DLNA media server in addition to the more typical UPnP server, and the USB port provides enough power to support a 500GB external hard drive. See the full review on page 86.

This isn't the least expensive router on the market, but we think it's worth every cent. www.netgear.com

THE REST OF THE BEST

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Games we are playing

- **Battlefield: Bad Company 2**
  badcompany.ea.com
- **Supreme Commander 2**
  www.supremecommander2.com
- **Mass Effect 2**
  www.masseffect.bioware.com
- **Napoleon: Total War**
  www.totalwar.com

For even more Best of the Best entries, such as speakers and budget components, go to http://www.maximumpc.com/best-of-the-best

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TP-650 Custom PC Magazine, (UK)

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